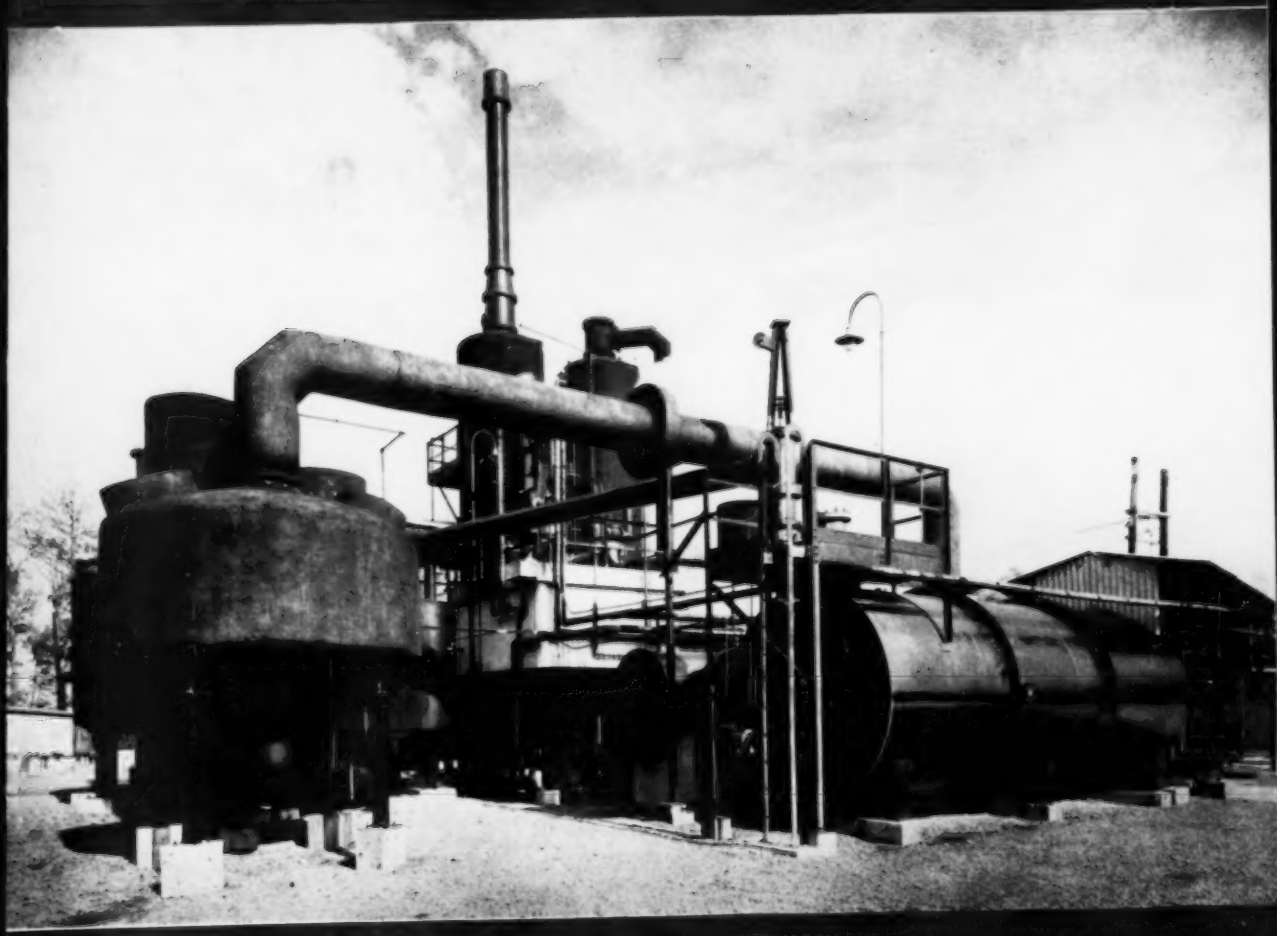
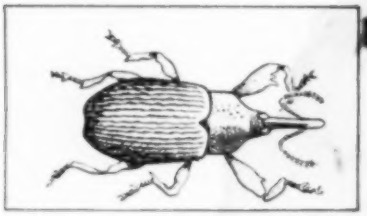
Vol. IV, No. 3 March, 1949

AGRICULTURAL CHEMICALS





BHC

Toxaphene

FOR EFFECTIVE CONTROL OF COTTON PESTS

BOLL WEEVILS—and many other destructive cotton insects—are efficiently and effectively controlled with POWCO BRAND BHC or POWCO BRAND Toxaphene. Both products are performance-proved...both are in demand and in use in your cotton growing sales areas.

Powell supplies BHC in dust concentrations of various gamma isomer strengths, or combined with DDT as POWCO BRAND Cotton Dust Concentrate. Toxaphene is available as a 40% dust. All are finely ground, free flowing—prepared specifically for easy, accurate formulation of your finished product.

Get ready *now* to meet the cotton growers' insecticide needs!

2,4-D AND INPC WEED KILLERS
DDT POWDERS AND LIQUIDS
BOTANICALS • ROTENONE • SABADILLA
PYRETHRUM POWDERS AND EXTRACTS
STIMTOX A
CHLORDANE POWDERS AND LIQUIDS
BHC POWDERS AND LIQUIDS
COTTON DUST CONCENTRATES
TOXAPHENE POWDERS AND LIQUIDS
TETRAETHYL PYROPHOSPHATE
ANTU
AEROSOL FORMULATIONS
PYRICENTS (Insecticide perfumes)
FYRNS

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POWCO

RATING POWER—THAT'S THE THING!

Quality and Service

You are assured on two important points — even in today's abnormal market — when you deal with P. C. A.

1. Quality . . . our Red Indian products are of unquestioned excellence.
2. Service . . . we make every effort to give you the service you want and deserve.

When better service is possible be assured P. C. A. will give it. Meanwhile your confidence, and your patience are greatly appreciated.

POTASH COMPANY OF AMERICA

CARLSBAD, NEW MEXICO

GENERAL SALES OFFICE . . 50 Broadway, New York, N. Y. • MIDWESTERN SALES OFFICE . . First National Bank Bldg., Peoria, Ill.
SOUTHERN SALES OFFICE . . Candler Building, Atlanta, Ga.

...it's a formulating job for ATTACLAY

Attaclay is a carrier which offers a *really satisfactory* way to formulate *liquid* pest control chemicals into dusts or wettable powders.

The following figures illustrate Attaclay's capacity to accept and carry high amounts of liquid toxicants *without loss of flowability:*

TOXICANT	WT. % IN MIXTURE
Toxaphene (chlorinated camphene)	40
Chlordane	40-50
Parathion	40-50

In each case, the product formed by intimate mixing of toxicant and Attaclay is a dry, lump-free powder possessing a high degree of fluidity. Mixing, material-handling and packaging equipment are permitted to give full-capacity performance. And the dust mixture flows just as smoothly after months of storage.

This same thirstiness that works so well with liquid poisons has made Attaclay the industry's overwhelming choice for supporting low-melting point solid toxicants in dusts.

Whatever your 1949 production plans embrace—liquids, solids, new poisons or older "standbys"—Attaclay in your formulas will substantially ease production problems and enhance product salability.

ATTAPULGUS CLAY COMPANY

Dept. P, 210 West Washington Square, Philadelphia 5, Pa.

AGRICULTURAL CHEMICALS

A Monthly Magazine For the Trade

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THIS MONTH'S COVER

To keep pace with increasing demand for agricultural chemicals, and the growing importance of fertilizer materials, plants such as this chemical contact sulfuric acid plant are being built in strategic spots. The out-door plant, shown here, is part of the American Cyanamid Co. installation at Mobile, Ala. Capacity is 50 tons of sulfuric acid per day. (Photo courtesy of Chemical Construction Corp., New York)

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VOL. IV No. 3

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AGRICULTURAL CHEMICALS

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Entered as Second Class Matter at the Post Office at New York, N. Y., under the Act of March 3rd, 1879.

Making mortality counts on insects.

NIFOS-T DEADLY to wide variety of insects

Leaves no toxic residue

The past two seasons have demonstrated the usefulness of Nifos*-T (Monsanto Tetraethyl Pyrophosphate) for controlling many pests that plague greenhouses, orchards and truck farms.

Here are some proved uses:

- ✔ Protection of greenhouse crops from aphids, mites, mealybugs and whitefly.
- ✔ Aphid control for canning and quick-freeze vegetable crops, such as peas, spinach, beans, cabbage and broccoli . . . Canners are recommending its use to their growers.
- ✔ Protection of shade and field-grown tobacco from aphid attack.
- ✔ Control of the periodical cicada (17-year locust) in young orchards.

Proved effectiveness—plus the fact that Nifos-T causes no problems of residual toxicity — is giving the product ever-expanding applications involving agricultural and horticultural pests.

SEND FOR LITERATURE

For more complete information ask for copies of Monsanto Technical Bulletin No. O-46, "Nifos-T," and a recent Monsanto study, "Determination of Tetraethyl Pyrophosphate in Mixtures of Ethyl Phosphate."

PROGRESS REPORT ON NIRAN

Monsanto's Parathion effective against greenhouse pests

Recent Government and University research has shown that Parathion (Monsanto's Niran*) gives excellent control of insect pests that attack greenhouse ornamentals.

Monsanto is producing limited amounts of Niran in 1949 for formulation by insecticide manufacturers.

FOR CONTROL OF WOODY WEEDS

2,4,5-T Acid
2,4,5-T Isopropyl Ester

Field experiments indicate that formulations of 2,4,5-T are highly effective in controlling woody weeds that are resistant to other herbicides.

Monsanto 2,4,5-T Acid and 2,4,5-T Isopropyl Ester are now available in moderate quantities . . . Inquiries are invited concerning properties and applications.

DILUENT FOR DDT

Latest data on SANTOCEL C

A recent bulletin of the U. S. Department of Agriculture, "Storage Tests on Conditioned and Wettable Powders Containing 90 Percent of DDT," is now available in reprint form from Monsanto.

The publication contains useful data on silica aerogel (Monsanto's Santocel* C) as a diluent for DDT formulations . . . Address requests for copies to MONSANTO CHEMICAL COMPANY, Merrimac Division, Boston 49, Mass.

1,500 SPECIES OF MOSQUITOES

Santobane an effective weapon

There are about 1,500 known species of mosquitoes in the world. However, their ranks are being depleted through intensive application of Santobane (Monsanto DDT) formulations.

In addition to its wide domestic use, Santobane is employed to combat malaria-carrying mosquitoes in tropical regions throughout the world.

EMULSIFIER FOR 2,4-D

Sterox SK recommended for use with 2,4-D Isopropyl Ester

Polyoxyethylene Thioether is efficient over wide ranges of pH and heat

Formulators of herbicides will find in Sterox* SK an excellent emulsifying agent for 2,4-D Isopropyl Ester. A product of Monsanto's Phosphate Division, Sterox SK is a clear, amber-colored polyoxyethylene thioether which contains no alkali. It is stable over a wide range of pH and heat—is equally efficient in solutions that are hot or cold, hard or soft, acid or alkaline.

Only small concentrations needed

Sterox SK is supplied in highly concentrated form, with the result that only about a 4% concentration is needed with 2,4-D Isopropyl Ester. This advantage, along with favorable prices, makes Sterox SK most economical to use.

Further details may be obtained by writing MONSANTO CHEMICAL COMPANY, Phosphate Division, or by noting your request on the coupon.

SANTOBANE NOW AVAILABLE IN THREE FORMS

Monsanto Santobane* is now furnished in three forms, all made to the highest standards of effectiveness and uniformity:

SANTOBANE

A high-quality, fine granular powder. Readily solubilized, emulsified or milled.

SANTOBANE 50

A straight dust concentrate containing excellent inerts. Free-flowing for air or ground dusting.

SANTOBANE 50W

An improved wettable form of Santobane 50. Contains a superior wetting agent permitting its addition direct to water to form a non-foaming fine suspension.

Send for 28-page Santobane book

Complete information on Santobane is contained in a 28-page illustrated book, "SANTOBANE, Monsanto DDT." Send for your copy.

ORTHODICHLOROBENZENE widely used for forest insect control

Effective against mountain pine beetle

Last summer 110,000 trees on one million acres of western forest land were threatened with an epidemic attack of the mountain pine beetle. As a countermeasure, standing trees were sprayed with a mixture of orthodichlorobenzene in fuel oil, to penetrate the bark and kill mature beetles before emergence. Five hundred men participated in the campaign, which lasted from May 1 until the latter part of July.

Further information on orthodichlorobenzene and its many important applications will be sent promptly on request.

Now available in five-gallon containers

As a service to small-volume consumers, Monsanto is now packaging orthodichlorobenzene in quantities as small as five gallons.

2,4-D helps cut small grain losses due to stem rust disease

Useful in eradicating rust-susceptible barberries

"The stem rust disease of wheat, oats, barley and rye is one of the most destructive of all the fungus diseases that attack small grains. Every year it reduces the yield and quality of these crops in some areas. In epidemic years it has caused losses in the United States of more than 180,000,000 bushels of grain."**

Monsanto 2,4-D Acid will help reduce these losses when properly used to destroy rust-susceptible barberries. It is recommended that barberry canes be cut off at the crown and that these freshly cut surfaces be treated with small amounts of 2,4-D in concentrated form. As a safety precaution, *only experienced persons should use this method.*

The destruction of barberry bushes eliminates early-spring sources of stem rust inoculum and eradicates the plants on which races of the fungus breed. There are many species and varieties of barberries. Most of them are susceptible to stem rust, but a few are immune or highly resistant . . . In addition to properly applying 2,4-D, farmers should use approved rust-resistant varieties of grain — follow cultural practices recommended by state experiment stations.

Monsanto furnishes 2,4-D in these three forms:

2,4-D Acid (99% minimum assay)
2,4-D Sodium Salt (minimum 82% equivalent 2,4-D acid)
2,4-D Isopropyl Ester (99% minimum assay)

Inquiries concerning technical data, prices and availability will be given prompt attention.

**Quoted from "Stem Rust," Picture Sheet No. 23, Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture. Copies available at five cents each from Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

WATCH THE WIND

When burning 2,4-D containers

We have recommended from time to time careful disposal of 2,4-D containers to avoid accidental contamination . . . Paper, fibre or wood containers should be burned so that they cannot be used for other products. If containers are burned, however, care must be taken that wind drift of volatilized 2,4-D is not permitted to contact growing crops.

*Reg U. S. Pat. Off.

☆ ☆ ☆

MONSANTO CHEMICAL COMPANY, Desk C, Organic Chemicals Division, 1766 South Second Street, St. Louis 4, Missouri. District Sales Offices: Birmingham, Boston, Charlotte, Chicago, Cincinnati, Cleveland, Detroit, Houston, Los Angeles, New York, Philadelphia, Portland, Ore., San Francisco, Seattle. In Canada, Monsanto (Canada) Ltd., Montreal.

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CHEMICALS — PLASTICS

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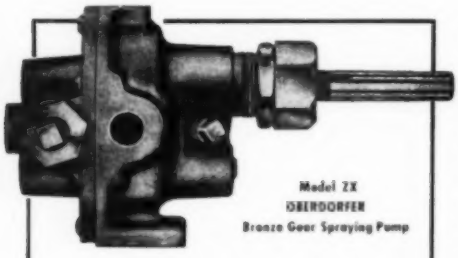
It took 50 years bronze gear pump manufacturing experience to produce *the complete line* of agricultural spraying pumps



Model ZX
OBERDORFER
Bronze Gear Spraying Pump

One of the *complete* line with capacities from 90 to 9,000 gallons per hour at 100 lb. pressure.

You can't decide today to make bronze gear pumps and come up with a complete, satisfactory line tomorrow. It has taken us here at Oberdorfer over 50 years of large-scale production, and everlasting striving for improvement to produce the *complete*, proved-in-service line of spraying pumps you see above—the Oberdorfer line as displayed at recent United States and Canadian weed control conferences. No other make can match its complete range of sizes or offer a comparable record of years of satisfactory service. Specify Oberdorfer Bronze Gear Pumps for all spraying equipment—as most leading manufacturers have already done—and be sure of pump satisfaction. Agricultural Pump Division, Oberdorfer Foundries, Inc., Syracuse 1, N. Y.

OBERDORFER BRONZE SPRAYING PUMPS

SHARSOL

FOR SOLUBILIZING 2,4-D ACID

Easy to Formulate

Economical to Use

SHARPLES TRADE MARK CHEMICALS

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ETHYL & BUTYLAMINES
ALKYLOLAMINES
AMYL ALCOHOL
AMYL ACETATE
AMYLPHENOLS
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UREA DERIVATIVES
RUBBER CHEMICALS
HYDROCARBONS
AMYL CHLORIDES
AMYL ETHER
DITHIOCARBAMIC ACID DERIVATIVES
CORROSION INHIBITORS

HERE'S THE

BIG INSECTICIDE MARKET for 1949

The parts eaten from this map represent the areas in which severe grasshopper infestations have been forecast by the U. S. Department of Agriculture. The worst GRASSHOPPER Plague since 1940 is predicted. Prepare now to meet the demand for grasshopper control.

Chlordane for GRASSHOPPER CONTROL

***CHLORDANE* is recommended by the U.S. Department of Agriculture for Grasshopper Control**

ESTIMATE THESE ADVANTAGES:

- **ECONOMICAL.** Here's real savings in cost. A higher concentration of *CHLORDANE* can be formulated into a given volume of emulsifiable concentrate than is practicable with other hydrocarbon insect toxicants. As high as 12 pounds of *CHLORDANE* can be formulated into one gallon. Consider the savings in labor, packaging, shipping and storage costs. One gallon of a 12 pound *CHLORDANE* concentrate will treat from 12 to 16 acres at the recommended dosages, ¾ to 1 pound *CHLORDANE* to the acre.
- **EASY-TO-FORMULATE.** *CHLORDANE* requires no special equipment, no heating, and being a liquid, mixes readily with other compounds.
- **VERSATILE.** *CHLORDANE* controls a wide variety of other destructive pests such as alfalfa weevil, Lygus bug, plum curculio, boll weevil, external animal parasites, ants, turf and soil pests and truck crop pests. It is compatible with 2,4-D, and most other insecticides and fungicides.

SAFE TO USE
Because of it's volatility CHLORDANE is safe to use on forage crops and pastures up to 2 or 3 weeks before harvest.

Write for complete formulating data and pamphlet on Direct Control of Grasshoppers, Alfalfa Weevil and Lygus Bug

Julius HYMAN & *Company**

Dept. AC., DENVER, COLORADO

Eastern Sales Office
11 West 42nd Street
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25 Beale Street
San Francisco, Calif.

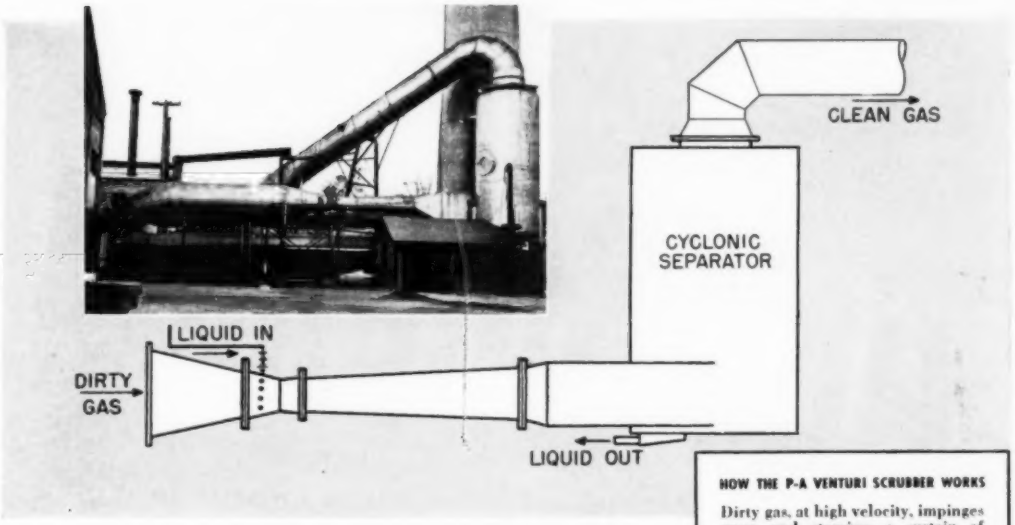
***Manufacturers of OCTA-KLOR (T.M.Reg.U.S.Pat.Off.) Technical Chlordane.**

FOR DIFFICULT GAS CLEANING PROBLEMS

CHEMICO *Now Offers*

The P-A Venturi Scrubber

(A PEASE-ANTHONY DEVELOPMENT)



HOW THE P-A VENTURI SCRUBBER WORKS

Dirty gas, at high velocity, impinges upon and atomizes a curtain of liquid introduced through jets at the throat of the Venturi. Differential velocities of gas and atomized liquid result in collision of mist or dust particles with liquid droplets. The coalescence of mist or agglomeration of dust resulting from this collision makes simple cyclonic separation possible.

APPLICATIONS: The P-A Venturi Scrubber is a highly effective and economical apparatus for solving such major industrial problems as: SMOKE ABATEMENT · REMOVAL OF DUST AND MIST FROM GASES · RECOVERY OF VALUABLE METALS AND CHEMICALS.

ADVANTAGES: Highly efficient—Assures virtually complete removal even of sub-micron dust and mist.

Low initial cost—The first cost of the P-A Venturi Scrubber is considerably less than other equipment of equivalent performance.

Low Maintenance — Its maintenance cost is less than that of other equipment of equivalent performance.

Low Water Requirement — Requires generally less water (or scrubbing liquid) than other liquid scrubbers.

Can Handle Gas At Any Temperature—Pilot Plant tests show no difficulties even at 1800° F. Actual installations now operating at 700° to 800° F.

More Compact and Lighter—It requires less space and is lighter in weight than other equipment of equivalent performance.

Simple and Safe to Operate and Maintain—Any competent maintenance man can service a P-A Venturi Scrubber. No special skill is needed to repair equipment.

Chemico's engineering background and development facilities combined with Pease-Anthony's experience in gas scrubbing offers highly qualified service in this field.

CHEMICAL CONSTRUCTION CORPORATION

EMPIRE STATE BUILDING, 350 FIFTH AVENUE, NEW YORK 1, N. Y.

EUROPEAN TECHNICAL REPRESENTATIVE

CYANAMID PRODUCTS, LTD., BRETTENHAM HOUSE, LANCASTER PLACE, LONDON W. C. 2, ENGLAND

CABLES: CHEMICONST, NEW YORK

Chemico Plants are profitable investments

Zinc Chloride

FOR USE IN—Preserving wood; Finishing paper and textiles; Flameproofing and dyeing textiles; Galvanizing; Manufacturing vulcanized fibre, batteries and glue.

Zinc Sulphate

FOR USE IN—Fertilizers and orchard sprays; dyeing and printing textiles; Electro plating; Electro galvanizing; making rayon, paint, varnish, glue.

At Wheatland, Pa., Maneely Chemical Company has one of the most efficient, modernly equipped chemical plants in the country.

Glass lined vats and equipment and a new process combine to give a new high in uniformity, purity and quality.

Manco

Maneely

CHEMICAL COMPANY

Dept. A • 1300 Bankers Securities Bldg. • Philadelphia 7, Pa.

Plant, Wheatland, Pa.

POTATOES PREFER "PARZATE"

Potato growers used to count themselves lucky if their crop escaped blight. Early potatoes, early blight. Late potatoes, late blight, and sometimes early blight too. To add to the problem, many of the chemicals applied to prevent blight often cut yields almost as much as the blight fungus itself.

But today the potato grower has a far better preventive for potato blights . . . Du Pont "Parzate" fungicide. "Parzate" controls both early and late blight, along with other fungous diseases of potatoes. And it is equally effective against diseases of tomatoes, celery, cucurbits, eggplant, beans and the like.

Even better, "Parzate" appears to improve crop foliage. In fact, users report healthier, thriftier plants which result in amazingly improved yields.

* * *

***"PARZATE"** is just one of many outstanding products of Du Pont research. You can get full information on this and other Du Pont farm chemicals from your local Du Pont technical representative. Or write to Du Pont, Grasselli Chemicals Dept., Wilmington 98, Delaware.*

DU PONT
REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY

DU PONT CHEMICALS FOR THE FARM INCLUDE:

Fungicides: **PARZATE® (Liquid and Dry), FERMATE®, ZERLATE®, Copper-A (Fixed Copper), SULFORON® and SULFORON®-X Wettable Sulfurs—*Insecticides:* DEENATE® DDT, MARLATE® (Methoxychlor), LEXONE® (Benzene Hexachlorids), KRENITE® Dinitro Spray—*Weed Killers:* AMMATE®, 2,4-D, TCA and Dinitro Weed Killers—*Also:* Du Pont Cotton Dusts, Du Pont Spreader Sticker, PARMONE® Fruit Drop Inhibitor and many others.**

®REG. U. S. PAT. OFF.

[On all chemicals always follow directions for application. Where warning or caution statements on use of the product are given, read them carefully.]

Tune in Du Pont "CAVALCADE OF AMERICA"—*Monday Nights, NBC Network*

CLOSES MULTIWALLS

"clam-tight"

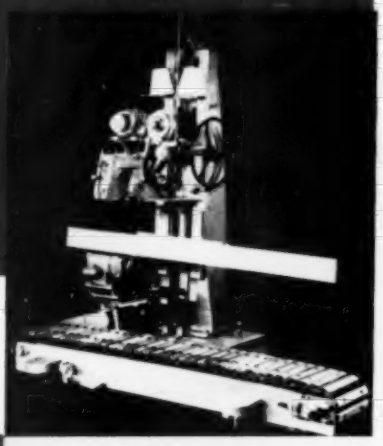
AT HIGH SPEEDS!

Your packaging time drops sharply when you're operating with a BAGPAKER.® Picture the savings from a machine that closes up to 15 heavy-duty multiwall paper bags per minute—a rugged long-lasting machine, too! And there's more than enough strength in a tough BAG-PAKER closure. It's made with the "cushion stitch", which absorbs strains and won't pull out.

Check the features of both BAGPAKER models shown at the right. One provides high speed, dependable closing; the other, in addition, gives a closure that resists moisture and is proof against contamination and sifting.

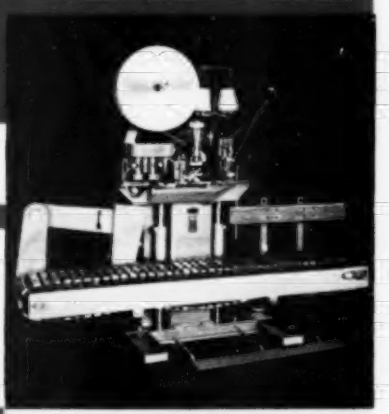
You're apt to discover more profitable closing and handling methods . . . more efficient multiwall bag uses, by discussing your needs with a BAGPAK engineer.

The famous BAGPAK® "cushion stitch"



MODEL "E 1" (portable)—closes up to 15 bags per minute. A single foot pedal controls both conveyor and sewing head. Handles both paper and textile bags.

Taped Closure (Model "DA")—it's moisture-resistant, sift-proof, tough



MODEL "DA" (portable) applies tape over "cushion stitch", making a tight seal. One operator, filling and closing, can handle 2 to 4 bags a minute . . . 6 to 12 where filled bags are delivered to BAGPAKER conveyor. Sewing operation starts and stops automatically—no tape wasted.

BAGPAK DIVISION

INTERNATIONAL PAPER COMPANY, Bagpak Division • 220 East 42nd Street, New York 17

Branch Offices: Atlanta, Baltimore, Boston, Chicago, Cleveland, Baxter Springs, Kans., Los Angeles, New Orleans, Philadelphia, Pittsburgh, St. Louis, San Francisco.
In Canada: Continental Paper Products, Ltd., Montreal, Ottawa.

EXPERTS ARE TELLING FOOD PROCESSORS TO "AVOID POISONOUS INSECTICIDES"

FOR ABSOLUTE SAFETY...USE

NON-POISONOUS PYROCIDE DUST

HIGH IN KILLING POWER
UNIFORM

● Government authorities have recently issued stiff warnings about insecticides used around food products. Milk has been found contaminated with dangerous quantities of toxic materials which have been sprayed on barn and cattle sprays. Some of the nation's largest food packers have now forbidden absolutely the use of poisons in connection with any products which the company buys. All canners and food processors are aware of this situation.

Avoid all risk by standardizing on PYROCIDE DUST. This excellent, uniform MGK product, long America's standard pyrethrum dust, is very economical because it extends pyrethrins 4 to 5 times. It controls certain aphids, squash bugs, cabbage worms, cabbage loopers, cucumber beetles, leaf hoppers, Mexican bean beetles, and many other chewing and sucking insects.

If you are now using pyrethrum in any form, you will certainly want to know the whole story of PYROCIDE DUST, made only from MGK's standardized, standardized Dry Pyrocide. Every formulator should have safe, non-irritant PYROCIDE DUST in his line to meet the demand.

The coupon below will bring you full information. Mail it now!

McLAUGHLIN GORMLEY
· KING COMPANY
MINNEAPOLIS, MINNESOTA

MAKERS OF INSECTICIDES — FOUNDED 1901

McLAUGHLIN GORMLEY KING CO.
Minneapolis 14, Minnesota

● Send us information on *Pyrocide Dust*. We are interested in
☐ Formulas ☐ Methods ☐ Prices

Name

Address

City Zone State

INTRODUCING

CPR

FOR MULTI-PURPOSE

DUST BASE

USE IN TRUCK FARM INSECT CONTROL

After five years of field testing in fifteen states, U. S. Industrial Chemicals is proud to present an outstanding new insecticide dust base—CPR. These tests proved that CPR Dust Base Insecticides control a wide range of insects which attack truck crops and vegetable and flower gardens. In addition, they proved that **CPR leaves absolutely no toxic residue harmful to humans.**

CPR Dust Base contains piperonyl cyclonene, pyrethrins and rotenone. It offers the advantages of effectiveness, safety, economy and convenience.

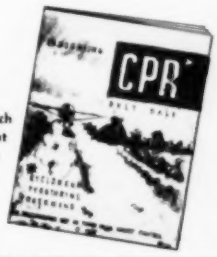
EFFECTIVE—CPR Dust Base makes possible the manufacture of insecticides which effectively control most species of insects attacking truck crops.

SAFE—Truck farmers and home gardeners may use insecticides made from CPR Dust Base with absolute safety to both user and ultimate consumer.

CONVENIENT—CPR Dust Base provides a mixture of all ingredients necessary for an effective dust combination. The physical properties are such that it blends readily with all commonly used diluents.

ECONOMICAL—CPR is low in cost and its preparation is simple and inexpensive. CPR is a uniform blend of active insecticidal ingredients, and mixing it with diluents and fungicides presents no problems.

Photo Courtesy Niagara Sprayer and Chemical Division, Food Machinery Corporation



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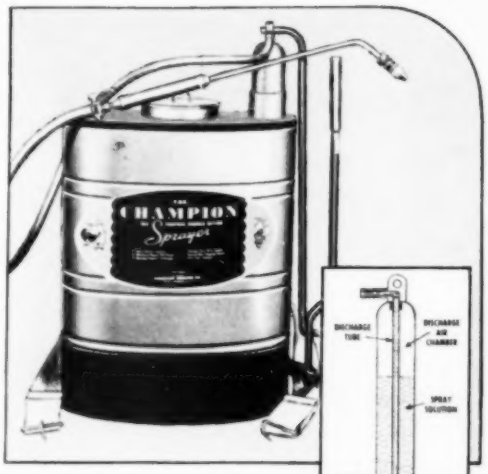

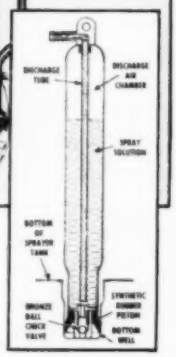

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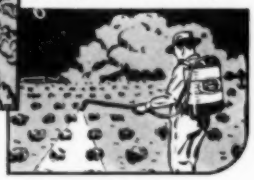

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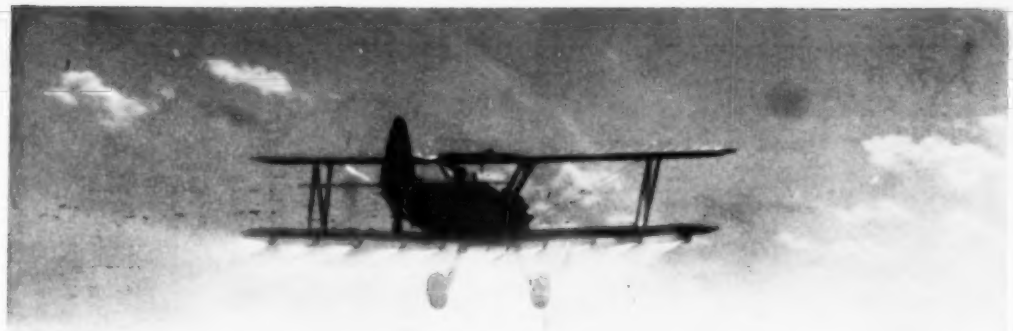

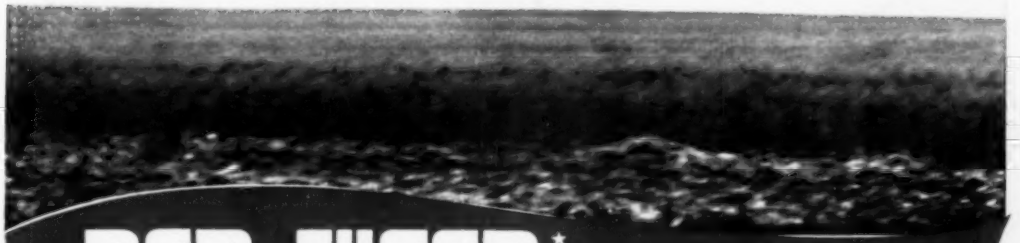

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CHEMICALS INDISPENSABLE TO INDUSTRY AND AGRICULTURE

THE EDITOR COMMENTS

THE rather startling falling off of farm prices is making many persons wonder if this isn't the beginning of the actual post-war recession which has been expected for the past two or three years. If the history of other similar events can be relied upon, the current situation follows the usual trend . . . the dropping of prices on abundant raw materials, followed by lower quotations on other commodities.

Facing the fertilizer and economic poisons industries is the question whether a "readjustment" of this type will lessen the demand for agricultural chemicals to any appreciable degree, or whether support prices will bolster the farmer's financial morale enough to keep him buying. But it is obvious in this connection that the Government must sooner or later take a realistic view of its subsidy setup, which means that, before long, adjustments will have to be made in keeping with the general price situation. It is inevitable, of course, that current support prices must come down.

Our chief interest in this decline is the immediate effect on the market for fertilizers, insecticides, fungicides, weed killers, et al, and more especially the effect six months or a year hence. Say what we will, preach as we may regarding the lack of logic in the situation, the farm demand for agricultural chemicals invariably follows the path of farm prices and income. When the farmer has money, he spends it for fertilizer and insecticides. When his money is short he cuts down on the use of chemicals, often with disastrous results.

As time goes on, perhaps, the gradual advance of science may tend to change this philosophy. But as things stand today, it is a fact, and a fact only too well known to every agricultural chemical processor and dealer throughout the country. Nevertheless, to continue to accept it blindly and permit the same vicious cycle to take its toll decade after decade seems somewhat incongruous in this enlightened age as great strides forward are being made in agricultural science. But what progress is being made in agricultural economics, of which this fertilizer and other chemical demand and use are an important factor?

If the big agricultural producing units temper their use of chemicals to physical needs scientifically determined, — and do not base their fertilizer and insecticide usage wholly on market prices of the crops which they produce, — why cannot the same idea be sold to the American farm community at large? Quite true, we have heard that you cannot get blood from a stone, nor money from an empty pocket, — but is this the real basis for lack of fertilizer and insecticide use in hard times, or is it faulty economic thinking which might be corrected in time through education? Most certainly, with the market which every agricultural chemical processor and dealer has at stake, and which could well be threatened again over the coming year by the same old bogey, the subject is worth a lot of deep thought right now.

IN view of recent statements voicing the need for "a sprayer on every farm," results of a recent survey by the Flax Institute are of interest. Although covering but a portion of the American agricultural landscape, the figures are at least interesting. The total number of sprayers in Iowa, for instance, is listed as 23,378, of which 22,407 are farmer-owned. The remaining 971 are the property of custom ground sprayers. The State of Minnesota is credited with having some 10,701 sprayers, while the Dakotas had a

total of 10,100 between them. Wisconsin, fifth state in the survey, claimed 4,500.

In the case of Iowa, the number of available sprayers runs about 11 per cent of the total number of farms in the State, or, roughly, one sprayer for every 9 farms. The ratio in Minnesota is even smaller, with one sprayer for about 20 farms. Wisconsin's 4,500 sprayers would have to work overtime several days a week to serve the 186,735 farms in that State.

These figures admittedly do not prove anything in themselves, but they do serve as an indication of the work to be done. The problem is one of salesmanship, affecting both the manufacturer of mechanical equipment and the chemical producer. With a greater distribution of sprayers, there is bound to be a corresponding increase in use of insecticides, fungicides and weed killers to keep these machines busy!

STARVATION is the grim spectre which confronts the world today, according to Sir Hartley Shawcross, Britain's Attorney General. In a recent address he urged that every effort be concentrated in building up world food production as the most pressing need confronting civilization. More food is the real answer to the chaos and anarchy which must follow any serious threat of starvation. While the countries and governments of the world are almost wholly preoccupied with national differences and jealousies, are so concerned with the threat of war that they are grossly overburdened with military expenditures, they pay scant attention to the calamitous danger which before long may confront them all, starvation, Sir Hartley says.

Obviously, Britain because of her nearness to the European picture and her own food problems, obtains a realistic view of the "grim spectre of starvation." Her authorities realize that food is more vitally important in preventing chaos and anarchy in a growing world population than all the guns and armies in creation. And prosaic as it may seem, increased food production hangs by the thread of more plant food, of expanded fertilizer output. Its lack is a main cause for the inability of the land to feed its population.

Today in the U.S.A., we are pretty well off, particularly in the matter of food production. We produce and use more fertilizer than the rest of the world put together. We have a strong, growing fertilizer industry, vital to the nation's well-being. Let us take Sir Hartley's words to heart and keep it that way!

WHILE the spotlight has been on weed control activities in the United States, with four major regional meetings and numerous State conferences having been held recently, the 1948 report of Canada's Minister of Agriculture indicates that great strides in chemical weed control are being undertaken in that country, too.

The report states that there are weed control investigations in each of the nine provinces, and that experiments are being conducted on twenty-two Dominion Experimental Farms across Canada. Reports of increasing the yield of flax, and of "excellent" control of numerous weeds in other grains as well as in vegetables and turf grass give some indication of the scope of Canadian experiments.

A sensible approach to the weed control problem is also noted, in that the report is not all commendatory. Use of herbicides in many situations is "undesirable," the report says, and Dominion investigators are making every effort to solve the multiplicity of problems both geographical and chemical, which attend such experiments.

With weed control research in the U.S. progressing at a rapid rate, it is encouraging to note that our neighboring country is likewise making headway in this complicated field. It will be of definite interest to all concerned when the results of these experiments are finally published so that comparisons may be made.

Guest Editorial written especially for this issue of Agricultural Chemicals.

Fertilizer Industry Looks at Future With Confidence

by Russell Coleman

VOLUMES have been written on the necessity of saving our soil fertility. The cause is by no means a losing one. Despite permanent soil fertility losses, man's ingenuity has enabled the United States to outrun the destructive forces which would prevent adequate agricultural production for its people.

Now many are contending that scientific agricultural progress has caused a new problem — overproduction. That this possibility exists cannot be denied, but the leadership of our Government and our industry working with American farmers can and must see that this problem, along with others, is solved.

A new look at our Nation today shows that postwar production is far greater than ever before, but so is the demand for goods. Changing conditions in the production of and demand for agricultural commodities requires a new perspective and perhaps a new concept on the part of agricultural leaders in industry and government.

Our increasing population offers not only increased demands, but also **new** demands. Current population increases are adding new agricultural customers at the rate of about 1 per cent each year, and since 1940 about one-third of our Nation's families, the basic consuming units, are new. Both of these factors mean more and different demands on agriculture. The increased demand for more meat and milk, for example, means new markets not only to the farmer, but also to the industries which serve him.

In its desire to satisfy demands, without overproduction, our Nation must not overlook the fact that its soil fertility, the Nation's most important natural resource, must be maintained. At the present time plantfood nutrients are being lost from the soil much faster than

(*Turn to page 79*)

Western Use of
Non-Metallic Minerals

THE advent of recently-developed organic insecticides has brought about the necessity of choosing carriers from a performance standpoint rather than the consideration of mere price and availability. Insecticide manufacturers have learned rapidly that the characteristics of a carrier, both physical and chemical, are of particular importance in formulating the newer organic preparations. The very success of grinding compounds like DDT depends greatly on the selection of a carrier; and at present, the relative stabilization of tetraethyl pyrophosphate, for instance, depends upon the development of specialized mixtures of non-metallic minerals.

The insecticide trade had been able for years to utilize at low cost, the by-products of other industries for use as carriers. In many cases, manufacturers of non-metallic materials could sell various items which had but little value otherwise. It appeared that as long as the price was reasonable, any such material could be sold to the insecticide dust manufacturer.

Today's picture has changed, of course. Under present circumstances, the very success of an organic insecticide frequently depends upon the proper selection of a carrier. The alliance between the producer of non-metallics and the insecticide manufacturer is being strengthened in order to take care of present as well as future problems connected with the production of effective organic insecticides.

Use in the Western States of non-metallic minerals for insecticide carriers is heavy, but output is considerable. Production of such exceeds 40,000 tons annually, and in addition to this output, minor tonnages are shipped westward from other parts of the country. Although the Pacific coast area contains practically all types of non-metallic minerals, full advantage of this fact cannot be taken because of the inaccessibility of some deposits and the lack of a market sufficient to warrant the relatively large capital investment required to start such an operation. This explains why some special types of non-metallics are shipped

TABLE 1
Range of Chemical and Physical Characteristics of the Common Non-Metallic Mineral Insecticide Diluents

	Kaolin	Fullers Earth Type	Bentonite (Swelling)	Unclassified Miscellaneous
SiO_2	41.60-59.00	53.00-64.00	59.57-64.32	54.5-71.51
Al_2O_3	27.81-42.50	10.56-27.37	19.67-24.64	12.5-20.52
MgO	0.05- 0.77	1.51-10.50	2.20- 2.67	1.03- 2.5
CaO	0.00- 1.06	0.11- 2.02	0.41- 0.72	1.08- 2.5
K_2O	0.03- 0.53	0.33- 3.31	0.15- 0.40	0.34- 0.66
Na_2O	0.01- 1.51	0.21- 1.61	0.60- 2.60	0.34- 0.27
Fe_2O_3	0.02- 2.29	2.36- 7.69	0.26- 3.60	1.40- 5.40
TiO_2	0.40- 2.30	0.39 -	-	0.25- 2.20
H_2O (Free)	0.50- 7.00	1. 0-15. 0	7. 5- 9. 0	0.30- 5.00
App. Density	28-44	38-59	54-60	29-36
% -325	92-99. 9	80-96	90-99	85
pH	4.5- 6. 8	4. 5- 7. 4	7. 5- 9. 2	7. 6- 9. 1
Used With	Rotenone Pyrethrum DDT Cryolite Nicotine Arsenates BHC	Rotenone Pyrethrum DDT Cryolite Liquid Bearing Dusts BHC	Liquid Bearing Dusts Emulsions	Various

General view of Talc City, near Darwin, California. Vast areas of west contain minerals suitable for insecticidal use, but some are difficult to utilize because of remote locations.

by

L. R. Moretti
Heckathorn & Co., Ltd.,
Richmond, California

to the West Coast from the east, even though the material may be available close by.

Unlike the situation in numerous other parts of the country, notably the east, production of minerals in the west takes place at the main points of consumption, rather than at the mine. The calcining and grinding mills are usually located near the point where the material will be used, largely because of the smaller markets and higher freight rates. In contrast, grinding mills along the eastern seaboard are ordinarily situated at the deposit.

Production of non-metallic minerals, particularly for the insecticide industry, has been hampered for a number of reasons. These include a lack of proper physical testing methods; a lack of liaison between the mineral producer and the insecticide manufacturer; and the relatively low volume consumed for insecticides compared to other uses. For economical production, a non-metallic material must have wide usage, since mineral diluents are low-priced, large volume commodities, as a rule.

Without attempting to compile a list of trade names, the non-metallic diluents are classified into five main groups, namely: clay, talc, silicas, lime products and some unclassified insecticide diluents. Into this latter category might fall sulfur which is also used as an active ingredient; gypsum, walnut shells, olive pomace and other sundry diluents which are used in minor amounts for specific purposes on the West Coast.

The clays are sub-divided into kaolin, Fullers earth type, bentonite, and miscellaneous. Their range of chemical and physical characteristics is seen in Table I.

Talcs may be classified from a mineralogical and physical basis into five general types. These are fibrous, lamellar, crystalline, soapstone and pyrophyllite. Choice of which of these to use is based largely upon physical considerations. The talc minerals are generally so stable that even wide variations in pH value are not essentially of importance in the finished dust. In table 2 is seen a tabulation of available talcs.

There are but three types of silicas and of these, only two are used in appreciable volume. These are diatomite and pumicite. The third, tripolite, is relatively unimportant. Diatomite and pumicite are regarded as particularly important carriers in the west. A summary of their respective characteristics may be seen in table 3.

Lime hydrate and ground limestone (calcium carbonate) are used in compounding insecticides. Lime is used widely, in part as an active ingredient and as a dust conditioning medium. These uses are tabulated in table 4.

Unclassified insecticide diluents, important in insecticide manufacturing, are pictured in table 5.

TABLE 2
A tabulation of the talcs available

	Fibrous	Lamellar	Crystalline	Soapstone	Pyrophyllite
SiO_2	39-62	37-57	43-61	43-50	73-79
MgO	23-33	38-34	28-32	23-32	0.1-
Al_2O_3	1-10	1- 5	0.3-6.0	0.3-9.0	17-21
CaO	.3- 6	0.1-10.0	0.2-8.0	2- 5	0.1-
Fe_2O_3	0.6-1.0	0.2- 7.0	0.1-7.0	6-10	0.1-0.5
H_2O (Free)	0.5-2.0	0.5- 3.0	0.5-3.0	0.5-3.0	0.5-3.0
App. Density	51-62	51-62	35-60	42-60	30-60
% —325	98-99	95-99.7	95-99.7	95- 9.7 95-99.7	0- 5 90-95
pH	8-9.5	8-9.5	7-9.5	8- 9.5	6- 8
Used With	Various	Rotenone Nicotine	Pyrethrum Arsenates BHC	DDT Cryolite	

Diluent Characteristics

THE numerical figure of the pH value should not be taken as the final element in evaluation of effective acid or alkaline character.

It is true that the pH value should be compatible with the active ingredients. However, the catalytic effects of minor and sometimes unrecognized constituents, such as high iron, available free moisture or loosely held water of crystallization may make a diluent of one pH value amendable for use with a particular organic insecticide when another diluent of the same pH value might be definitely injurious.

In general, diluents on the acid side are used wtih rotenone, pyrethrum, DDT, BHC, and cryolite. Those on the alkaline side are used with nicotine, and the arsenates.

The talcs, with some exceptions in the pyrophyllites, are all on the alkaline side. Because

of their stability, however, they are widely used on the west coast as carriers for rotenone and the organics.

If the active ingredient is a stomach poison, contact, or fumigant, the type of carrier must be suitable for the job to be done. Therefore, the carrier must be examined to determine whether it helps distribute the economic poison to the proper place. Some carriers actually impregnate themselves with the material; others surround it and will not release it. Livestock application, for instance, certainly demands a different carrier from row crop application. Here a product such as pyrophyllite tends to reach the animal body more readily than clay.

In application methods, generally speaking, ground dusting procedures require dusts ranging from 35 to 45 pounds per cubic foot. Airplane dusts have a bulk density in the vicinity of 60 pounds per cubic foot. The heavier the specific gravity, the greater the tendency to settle in the turbulent air conditions created by this method of application.

The problem of drift is becoming increasingly important with the advent of herbicides. In this respect, ground equipment can cause as much drift as airplane dusting. It behooves the dust manufacturer to consider this factor seriously, or face possible legislation restricting his activities. Because of drift, inert materials with high specific gravity are rapidly becoming popular for dust. Diluents such as Barium Sulphate (Barytes) have possible uses on a limited scale as such high specific gravity dusts, 4.0-4.5, when mixed with other carriers tend to pull the composite dust mixture to earth. Drift is related very closely to particle size and bulk density.

Wettable powders, when finely ground, require different diluents than insecticide dusts Here we are more interested in colloidal suspension, wettability, sorption, and ability to grind.

Particle Size

GENERALLY, a mineral dust passing 90% to 99.9% through a 325 mesh screen when produced by air classification sizing is satisfactory. The particles must be fine enough to carry the active poison efficiently and not injure foilage when used with high speed application.

The problem of selection of the proper grain size is a mass factor. The behavior of the diluent particles should match accurately the behavior of the active ingredient particles in free air to prevent separation. Thus, the balance of ingredients in a dust is as important as balance of ingredients in making emulsions in liquids.

Within the practical limits of the foregoing considerations, the finer the particle, the better the balance of the dust or wettable powder. Wettable powders behave better in the micron range while dusts tend to behave better in the screen sizes. The selection of proper particle size for efficient use of an active ingredient may be further involved by vapor pressure considerations. In some instances, vapor pressure requirements may be of paramount importance and may thus dictate particle size requirements.

The range of particle is more important than the average particle size for a balanced dust. The porosity methods of measuring particle size have often misled manufacturers into thinking their dusts were properly ground. They might have an average of 2 microns with particles as large as 50 to 60 microns. Both average and range of particles have to be considered. The narrower the range, the more desirable the powder for both dust and wettable powder.

The question of bulk density is also a mass factor. Flowability of a dust may be controlled to some extent by variation in bulk density. Bulk density definitely affects the behavior of the dust in free air as has been discussed already. This item is particularly important to the sales staff as variations in bulk affect the type and size of containers. It is naturally desirable to have the package full.

The most important thing a carrier must do is to deposit the active ingredient in the proper place for pest control. With the accent on flowability of dust, adhesion has been sacrificed definitely. Oftimes a carrier has to be assisted by some chemical sticker. Deposition of dust under all weather conditions, wet or dry, is very necessary. A new group of resinated additives as conditioners for dust look very promising

TABLE 3
Three Types of Silicas

	Diatomaceous Earth	Pumice & Pumicite	Tripolite
SiO_2	73-91	72.90-73.18	93-99
Al_2O_3	2-10	11.20-15.46	
MgO		0.36- 0.40	
CaO	0.1-2.0	0.80- 1.37	
K_2O		3.66- 4.38	
Na_2O		3.66- 3.64	
FeO	0.5-2.0	0.86- 1.09	
TiO_2		0.06-	
H_2O		0.05- 7.0	
App. Density	12-20	46-60	55-
%—325	97-99	90-99.6	88-98
pH	4.5-7.0	5.4 - 8.9	5.4- 7.0
Used With	Any Active and with gaseous and liquid bearing dusts	DDT Rotenone Pyrethrum Cryolite Nicotine Arsenates	

TABLE 4
Use of Lime Products in Insecticides

	Hydrate	Calcium Carbonate
CaO	70-74	$CaCO_3$ 78-99.5
MgO	0.4-12.0	$MgCO_3$ 0.3-12.
$Ca(OH)_2$	85-98	
Fe_2O_3	0.99-0.3	0.01- 0.34
CO_2	.32-71	
App. Density	32-71	.30-55
%—325	90-99.7	95-99.8
pH	11-12.5	7.7- 9.5
Used With	As an active chemical and in part a conditioning medium.	Various

at present. A dust therefore must have a number of characteristics. It must be flowable, adhere to plants, either wet or dry, and be able to carry the active ingredient to the plant. The addition of some of these chemical additives could possibly become the obligation of the non-metallic producer.

Abrasiveness

THE problem of abrasion can be a serious one both to the insecticide manufacturer and applicators. Free silica in dust will wear out the grinding, dusting, and spraying equipment rapidly.

Some pyrophyllites, high in free silica, have been offered to the west coast trade in the past and when they were used in high speed ground dusters, they created a havoc of destruction in dusting equipment. The results have been that most of the insecticide trade looks upon pyrophyllite as an essentially abrasive dust. This is not necessarily true and all reliable producers have eliminated free silica from their products.

The term "silica" covers the compound SiO_2 or that portion of a mineral which is SiO_2. This SiO_2 may be combined with magnesia and other elements to form such natural products as talc which we all know is very soft. It may also be such a compound as quartz, chert, feldspar and other similar minerals which are regularly used as abrasives because of their essential hardness.

It is the physical state of the silica as well as its chemical affiliation in the particular mineral which imparts the quality of abrasiveness which is of concern to the compounder of insecticides. This question of hardness of silica contained in the mineral dust is one which can be ascertained readily by reference to the standard texts on mineralogy.

The sorption qualities of a diluent are of vital importance where it is desired to introduce a liquid into powder and at the same time maintain a free flowing dust product.

The sorption is also important in grinding and formulating low melting point compounds such as chlorinated camphene and DDT. It is also very desirable when a liquid emulsifier is being added for a wetting agent. The clays and diatomaceous earths are usually the most useful when a dust requires sorption. This is one characteristic which is readily checked in the laboratory.

The rate of absorption and adhesion are closely related to flowability. There are two of these which must be considered: (a) The flowability of the carrier after calcination and grinding to 325 mesh. (b) Flowability after inclusion in dust mixture.

There is often a tremendous difference in this characteristic after manufacture and storage. Flowability is particularly important in achieving even distribution by getting even flow within the vehicle of application.

The rate of mixing or grinding achieved with one carrier is remarkably different from another. For example, the writers know of two clays which are identical in all measurable physical and chemical characteristics, yet one grinds more DDT per hour than does the other. Unfortunately, productability can be measured only by an actual production run. This is often a very costly method of experimentation.

Some carriers tend to form into balls in mixers and elevators and thereby reduce production considerably. On other occasions they may be too light to flow down chutes without mechanical help.

Uniformity of non-metallic products poses somewhat of a problem for the producer, even though the material comes from the same mine or deposit. Nature's products may vary widely even in areas close together. Thus, even with the best intentions, a producer may err in believing his product is uniform and that its use will meet the insecticide manufacturer's needs. Only by adequate drilling and sampling can the miner be sure that his product is uniform, and even so, he must restrict his operations to sections where the

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TABLE 5

	Gypsum	Sulphur
$CaSO_4 \cdot 2H_2O$	95-98	S. 99-99.9
App. Density		.35-45
%—325	95-98	98-99.9
pH	6.5-7.0	5- 6.5
Used With	Selective uses for special purposes. Not widely used	Lead Arsenate Rotenone
Walnut Shell Flour		
App. Density	.39-42	
%—325	60-90	
pH	4-5	
Used With	For increasing bulk & flowability	

Future Development of U.S.D.A. Research

EXPANSION of the cooperative research program with radioactive materials has progressed rather rapidly during the past two years. The rate of growth is illustrated by the fact that in 1947, only five men were working on the project, and by 1950 the number is expected to be 25, at Beltsville alone. Only 100 pounds of radioactive superphosphate were used in field experiments in a couple of states in 1947; but in 1948 the experiments involved the use of 700 pounds of superphosphate, or its equivalent, in field experiments in five States. Recently formulated plans for 1949 call for the use of about 1,100 pounds of radioactive superphosphate, or its equivalent in some 15 States.

Mere rapid growth does not necessarily indicate a sound program, however, so it should be profitable to examine the over all plan. The program is divided into three general groups, each of which is discussed here under the headings of development, fundamental research and applied research on soil and fertilizer problems.

Development Research

THE handling and use of radioactive materials are so different from anything agricultural scientists have done before, that considerable development work is essential before experiments in the greenhouse or field are feasible. The nature of the problems encountered is quite different for the various elements. They depend primarily on the kind of radiation emitted by the element, the length of time it remains radioactive, and its movement in the soil. During the past two years and for the next three to five years, a good deal of our research will be devoted to the development of methods and techniques for the use of isotopes in agricultural research.

What has been accomplished in development research to date? Safe and effective procedures have been developed for the manufacture of different radioactive phosphates and their use in laboratory, greenhouse, and field experiments. This was relatively easy, for radioactive phosphorus has a comparatively short life, 14.3 days, and therefore does not constitute a health hazard for more than a few months. It emits a strong beta ray, easily measured but easily stopped and far less of a hazard than the penetrating gamma ray emitted by many isotopes. Procedures have also been developed for the rapid assay of radioactive phosphorus in plant material. During the past season the North Carolina laboratory handled more than 2,000 samples.

The use of radioactive rock phosphate presents several special problems on which work is in progress. It seems improbable that the development research will have reached a point permitting field experiments with rock phosphate before 1950, although a small initial experiment may be started this year.

Initial but quite limited experiments have been conducted with radioactive calcium which has a half life of 180 days and, therefore, if applied to a soil in quantity would present a health hazard for five to eight years.

Fertilizer distributing and placement equipment has been modified for handling radioactive fertilizers. This work is being continued. It is hoped that thoroughly satisfactory equipment will have been perfected by the close of the year.

What development research is planned for the future? Some of the first work will be directed to the development of procedures for the safe and effective use of radioactive calcium and sulfur. This involves a study of their movement in the soil, possible contamination of drainage water, absorption by plants, and possible methods of blanketing or minimizing the radioactivity. This work is an essential first step toward field experiments in which the utilization of calcium and phosphorus from superphosphate and other fertilizer and liming materials will be studied.

Other development work will relate to procedures for the

Program

use of minor elements — copper, zinc, molybdenum, and iron — in both soil and plant nutrition investigations.

Fundamental Research

THE fundamental research program includes:

1. A study of the chemistry of native and applied nutrient elements in soils.
2. Investigations on root-soil relationships and the absorption of nutrients by plant roots.
3. Research on the movement and function of nutrient elements in plants.

Experiments in this field have been limited to work with radioactive phosphorus and calcium. In the case of radioactive phosphorus, initial studies have given new evidence on the reactions involved in phosphorus fixation by acid soils and the release of phosphorus to the soil solution and to plants. Similar work is in progress with calcareous soils of the west. These investigations are giving a better understanding of phosphorus in soils and may well lead to improved methods for determining the phosphorus fertility status of soils. The radioactive calcium studies in progress relate to base exchange reactions.

The fundamental research contemplated will include work with soils and fertilizers, soil-plant relationships, and plant nutrition. The investigations in progress on phosphates are to be intensified. In addition, isotopic methods are being developed that may be useful in characterizing rock phosphate from different sources. Such studies will be conducted along with vegetative tests with rock phosphates. We are also hopeful that the better characterization of rock phosphates will be useful in explaining their behavior while being processed by either wet or thermal methods.

As another example, consider potash. Radioactive potassium has a half life of only 12.4 hours, so it cannot be used in experiments of more than a few days duration. Field experiments such as those with phosphates are impossible. Nevertheless, it may be useful in fundamental studies on the chemistry of potassium in soils. We know that soils differ widely in the rate at which they release mineral or non-exchangeable potash to growing crops. They also differ in the extent to which they fix applied potash, and reduce its availability to plants. The nature of the release and fixation reactions will be studied by means of radioactive potassium. It may possibly offer a method for estimating the non-exchangeable potash in soils and its rate of release. Isotopic techniques certainly offer a promising method of advancing our knowledge of the chemistry of potash in soil colloids.

Liming is known to influence the availability of potash. Careful studies with radioactive potash and radioactive limestone may help to clarify the calcium-potash relationships in both soils and plants.

Our knowledge of the chemistry of minor elements such as copper and zinc in soils is quite limited. This is due in part to inadequate methods for measuring very small quantities. As is well known, radio isotopic techniques are extremely sensitive. We believe, therefore, that they will be exceptionally useful in studying the chemistry and movement of minor elements in soils. Progress in this field may be slow. Concentration of initial efforts on one element — zinc — rather than spreading research efforts, is the probable procedure.

The fundamental research with plants will be directed primarily to studies on the movement and function of certain of the minor elements. Such work will have a direct bearing on many nutritional problems of both annual and tree crops. One such problem is chlorosis that is so widespread in several Western States.

Applied Research

APPLICATION of isotopic methods to soil, fertilizer, and crop production problems is undoubtedly of major interest to fertilizer manufacturers. The work of the last two years has demonstrated the utility of isotopic methods in fertilizer investigations. To date, work in the applied field has been restricted to radio-active phosphorus. What of the future program?

by

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* Presented at a meeting with members of the fertilizer industry, Washington, D.C., January 26, 1949.

The 1949 research program is limited to phosphorus and will be similar in most respects to that conducted last year. It will involve comparisons of crops, sources of phosphorus, rates and placement of phosphates on different soils. According to present plans, experiments will be conducted in New York, Ohio, Indiana, Wisconsin, Iowa, North Carolina, South Carolina, Georgia, Florida, Mississippi, Texas, Colorado, Arizona, and Idaho.

The phosphorus materials experiments have been limited to superphosphate, ammoniated superphosphate, dicalcium, alpha tricalcium, and calcium metaphosphates. This year some of the experiments will include ammonium phosphate. If effective methods are developed, liquid phosphoric acid and rock phosphate will be included in the field experiments. Special emphasis is being given to comparisons of phosphate materials on the calcareous soils of the west. The results should be useful in connection with the development of our western phosphorus resources.

It is well known that superphosphate undergoes many reactions in the manufacture of mixed fertilizers. The nature and extent of those reactions depend on the method of formulation and conditions of storage. What influence they have on the availability of phosphorus to crops has not been determined. We are hopeful that it can be determined by isotopic methods. Future research will be directed to this problem. The crop utilization investigations will be integrated with chemical studies on fertilizer formulation and storage.

Probably the next radioactive elements to be used in field experiments will be calcium and sulfur. Initial field experiments with these elements will be started in 1950. Fertilizers carry calcium in several forms — calcium phosphates, calcium sulfate, and as dolomite. Sulfur is in the form of calcium sulfate, ammonium sulfate, and potassium sulfate. The extent to which these sources are utilized by crops should be determined.

Normal superphosphate contains about 20% calcium oxide (CaO) and 30% sulfur trioxide (SO_3), as well as 20% phosphoric acid (P_2O_5). Its value in crop production cannot be attributed solely to phosphorus. Experiments, therefore, will be conducted to determine by isotopic methods the utilization of both calcium and sulfur in superphosphate by various crops under different conditions.

The applied research program will certainly include liming experiments in order to secure a direct measurement of the utilization of applied calcium. As in the case of phosphorus, variables will probably include rates, placements, and materials in relation to soils and crops. Unlike radioactive phosphorus, which can only be followed during one season, the utilization of one application of radioactive calcium can be followed five or more seasons. Unfortunately the radioactive isotopes of magnesium are not of such a nature as to make possible studies on the utilization of magnesium in dolomite by isotopic methods.

Applied research with minor elements will probably develop along the lines indicated for phosphorus, calcium, and sulfur. In addition the experiments will include spray applications to foliage and studies of translocation in the plant, especially in tree crops.

Organization & Facilities

THIS research program from the very beginning has been developed by the Bureau and State agricultural experiment stations with the counsel and support of the Phosphate Research Committee of the fertilizer industry. That arrangement has many advantages. It often becomes difficult, however, to give proper credit to men making important contributions to the work, but the advantages far outweigh such difficulties.

The special facilities required in this work have been developed with the project. The $31,000 contributed by members of the fertilizer industry during the last two years has been largely used to provide essential facilities. These include equipment for the manufacture of different radioactive phosphates and facilities for the assay of radioactive phosphorus in plant material.

The Bureau of Plant Industry and the Atomic Energy Commission have recently completed arrangements whereby the Commission will support a strong development and fundamental research program with isotopes at the Plant Industry Station. Special greenhouse and laboratory facilities will be constructed, and our facilities for the manufacture of radioactive fertilizers will be constructed, and our facilities for the manufacture of radioactive fertilizers will be expanded. The Bureau, therefore, will be in a position to supply radioactive fertilizers and related materials to research agencies authorized to use them by the Atomic Energy Commission. The AEC project makes possible a considerable expansion of the essential development and fundamental research.

This expansion in developmental and fundamental research will make possible a steady increase in the application of isotopic methods to fertilizer, soil management and fertility, and crop production problems. As plans for such work are formulated, the following points should be considered:

1. The amount of information derived from radioactive fertilizer experiments is often several-fold greater than for most fertilizer experiments —and the cost of such experiments

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Progress Report on

TOXAPHENE

by

E. N. Woodbury

THE effectiveness of toxaphene* against a wide variety of insects has been under study for a number of years. One of the outstanding results of this experimentation has been the acceptance of the insecticide as a control measure against all common insect pests. States throughout the cotton belt have listed toxaphene in their 1949 recommendations. The U.S.D.A. also has accepted toxaphene and recommends it for grasshopper and fall armyworm control.

Further tests with the material are being continued against other insect pests. Even though the results are not yet conclusive, they are being released now to aid research workers who are planning tests designed to establish optimum concentrations and rates of application against these insects, or upon other species against which toxaphene has not yet been tried. It must be remembered that this compilation is not intended to serve as a basis for commercial application.

The residue resulting from dusting or spraying crops with toxaphene may persist for days or weeks after application. Until more is known of the possible health hazards which may be involved in connection with human consumption of treated crops, the application to those parts of vegetable or fruit crops consumed by humans is not recommended unless the residue is removed at harvest or application can be so timed that no residue is present at harvesting.

Not too much is yet known about the effect of toxaphene on the productivity of the soil. However, tests indicate[1,2,3] that it is broken down in the soil by microorganisms and rendered harmless within a rather short time.

In general, toxaphene applied at rates giving insect control has not been injurious to a wide variety of plant species. However, it has caused severe injury to cucurbits, particularly young plants under conditions of high humidity. Injury has also been observed on the Kahtadin potato, Imperial Gage plum, and Italian prune. Where wettable sulfur has been included for brown rot control, no injury has occurred on peaches, but toxaphene used alone has caused injury. Toxaphene oil solutions applied to young corn (3-5 inches high) have also caused some injury.

Most of this information has been obtained in field tests, varying in size from small plots to large acreages, and from greenhouse and laboratory tests. In a few cases, the data are based on actual, successful commercial use.

Good Control Possible

WHEN used against cereal or forage crop insects, toxaphene has given control ranging from good to excellent. A 20% toxaphene dust at 25 pounds per acre gives good control of peanut thrips and the peanut leafhopper. Commercial tests proved that 10 to 40 pounds of 10% toxaphene dust per acre gave good control of the fall armyworm, while 10 to 20 pounds of 10% toxaphene dust per acre gave excellent control of the velvetbean caterpillar on soybeans and peanuts.

A 10% toxaphene dust used at rates of 15 to 25 pounds per acre has produced good to excellent control of the alfalfa weevil, lygus, and yellow-striped armyworm on alfalfa. A 100% kill was obtained by using an emulsion spray of 3.6 pounds of toxaphene per acre against the alfalfa looper.

Against the chinch bug, 10 to 20 pounds of 20% toxaphene dust per acre gave good control. 100% control was obtained within

* Chlorinated camphene, containing 67-69% Cl.

three days against spittle bugs on alfalfa during a heavy infestation period by using 1.5 pounds of toxaphene per acre as a wettable powder or emulsion. Application of from 20 to 40 pounds of 5% toxaphene dust per acre gave 100% control of the cowpea curculio.

Good to excellent control has been obtained against truck crop insects, also. Four pounds of 25% toxaphene wettable powder per 100 gallons of water gave good control of the imported cabbageworm, diamondback moth, cabbage looper, and cabbage aphid. The same dosage gave a 100% kill of the celery leaf tier.

A 20% toxaphene dust, applied to give good coverage, will control the squash bug.(**) The same application of 10% toxaphene dust is effective against the striped cucumber beetle(**) and the spotted cucumber beetle.(**) In commercial tests, 1 to 2 pounds of toxaphene per acre in the form of wettable powder or 10% dust gave good control of the serpentine leaf miner on potatoes, tomatoes, beans, and eggplant.

Against the bean leaf roller, 1.5 to 4 pounds of toxaphene per acre, applied as a spray or dust, gives good control. Good commercial control of the armyworm, fall armyworm, variegated cutworm, and greasy cutworm is achieved by using 10 to 40 pounds of 10% toxaphene dust per acre.

On celery, a bran bait containing 5% toxaphene is effective against climbing cutworms, while 3 pounds of 40% toxaphene wettable powder per 100 gallons of water gives good control of the green cutworm.

Excellent control of onion thrips was obtained by using 5% to 10% toxaphene dust to give good coverage, or an emulsion containing 1 pound of toxaphene per 100 gallons of water. Against the Southern mole cricket, a soil treatment with 8 pounds of 25% toxaphene wettable powder per 100 gallons of water per 100 square feet proved effective.

Toxaphene has provided good control of tobacco insects. When applied either as a dust or spray, 1 to 3 pounds of toxaphene per acre will control the tobacco hornworm, tobacco budworm, tobacco fleabeetle, the suckfly, and the tomato hornworm. Regular applications of 20% toxaphene dust to give good coverage prevents a heavy build-up of the green peach aphid.

On potatoes,(***) an emulsion spray containing one pound of toxaphene per 100 gallons of water, applied at the rate of 75 to 100 gallons of spray per acre gives good control of the potato leafhopper, potato fleabeetle, Colorado potato beetle, and the potato psylla. The leaf miner and potato aphid can be controlled by applying 20 pounds of 10% toxaphene per acre.

Good control of the sugarbeet webworm is achieved by using 1 to 3 pounds of toxaphene per acre as a dust or spray.

The results against fruit and nut tree insects vary. An emulsion containing one-half to one pound of toxaphene per 100 gallons of water gave good control of the pear psylla. With 4 pounds of 25% toxaphene wettable powder per 100 gallons of water, results against the plum curculio have been variable, while control of the black pecan aphid and the pecan weevil was good in preliminary tests. Control of the codling moth has been generally poor, while control of the European red mite and Pacific mite has ranged from fair to good. A spray containing 6 pounds of toxaphene wettable powder per 100 gallons of water gave 25% better control than standard lead arsenate treatment in the same experiment against the stink bug on peaches.

Results against a number of ornamental and shade tree and flower insects were good. A spray of 4 pounds of 25% toxaphene wettable powder per 100 gallons of water gave 100% control of the Eastern tent caterpillar in a week and was found to be equal to 6 pounds of lead arsenate plus sticker on bagworms. A 100% kill was obtained by using an emulsion spray containing one part of toxaphene per 400 parts of water on the green chrysanthemum aphid. Good coverage of a 20% toxaphene dust at 2 or 3 week intervals gave a harvest of 90% marketable spikes in a test against gladiolus thrips.

(**) Toxaphene is extremely injurious to many cucurbits, particularly under conditions of high humidity.
(***) Injury has occurred on Kahtadin.

REFERENCES:

(1) Rohwer, S. A., Use of Insecticidal Chemicals for Control of Crop Pests. Paper presented before the American Seed Trade Association, Chicago, Illinois, in November, 1948.

(2) Cullinan, F. P., Some New Insecticides—Their Effect on Plants and Soils. Paper presented before the American Association of Economic Entomologists, New York, N. Y., December 14, 1948.

(3) Smith, N. R., and Marie E. Wenzel, Soil Microorganisms Are Affected by Some of the New Insecticides. Soil Science Society of America Proceedings, 12:227-233, 1949.

Good control reported for toxaphene, now a generic term for insecticide containing 67-69 per cent chlorine. Material recommended for control of insect pests on cotton. Studies made to determine injury, if any, on plants.

Development and Progress in NEW FUNGICIDES

By Martin C. Goldsworthy
Vice Director, Agricultural Experiment Station

FOR a long time, the U.S. Department of Agriculture has been interested in the development and the improvement of fungicides for the control of plant diseases.

Discovery of the fungicidal properties of the "copper mixture of Gironde" later known as "bordeaux mixture" by A. Millardet in 1882,[10] was followed up by experimental work in the Department by B. T. Galloway,[3] D. G. Fairchild,[2] F. L. Scribner,[14] W. T. Swingle,[16] and M. B. Waite.[18] They improved this mixture and adapted it to the various diseases then encountered on numerous fruit and vegetable crops. This discovery also led these same investigators to the possible use of other copper salts which could be made as easily as the basic sulfates of bordeaux mixture. For this purpose Galloway and Fairchild studied copper in combination with phosphates, silicates, chlorides, oxides, etc. These salts were never made sufficiently free of their reacting soluble constituents and they all produced enough injury to cause search in this direction to be abandoned.

The introduction, at this stage, of the soluble concentrates of calcium polysulfides (liquid lime sulfur) by A. B. Cordley in 1905[1] as a summer spray on apples, peaches, and plums led to work by W. M. Scott[12] in 1907, in the Department, which brought into use the self-boiled lime sulfur concentrates for use on peaches and plums. At this same time Waite[18] experimented with metallic sulfides, but with little success.

Following these early advances, the use of bordeaux mixture, lime sulfur, and self-boiled lime sulfur became standard practice in fruit and vegetable production. This lasted until the late twenties when, due to certain circumstances, such as consumer demand for graded fruits and vegetables and intensified production, some concern was noted over the corrosive characteristics of these materials. This led to a restudy of the possibility of finding suitable noncorrosive substitutes for the standard fungicides. This work was centered, in the Department, in a group headed by Dr. J. W. Roberts. The writer and Mr. E. L. Green were added to the project later.

In setting up the project in 1931, it was realized that its success was impossible without the cooperation of the chemical industry. Certain firms have cooperated through furnishing small but sufficient supplies of some of the materials found valuable in laboratory tests.

The initial research under this project was undertaken to obtain a better understanding of the characteristics of many of the insoluble copper compounds. Methods of copper analysis were developed which made possible the determination of very small quantities of soluble copper. Biological assay methods were also developed for distinguishing between soluble copper and available copper. This enabled the researchers to determine most precisely the fungicidal capacities of all of the fixed copper compounds. This knowledge furnished the clues indicating which of these materials were apt to be useful and suitable for any given crop plant. This pioneering work soon led to the adaptation to agriculture of the insoluble coppers as bordeaux mixture substitutes. While the object was specifically to find new fungicides for fruit crops, other researchers were equally anxious to find similar chemicals for vegetable crops. J. G. Horsfall[5] was busy at the Geneva, (N. Y.) Agricultural Experiment Station studying the effects of some of these copper insolubles on damping off diseases of vegetables. A. C. Sessions[15] in New Jersey was experimenting with the silicates of copper for tree fungicides, and A. A. Nikitin[12] in Tennessee was calculating the use of copper zeolites for all kinds of crops. European investigators were busy with the colloidal coppers and also the oxychlorides. These studies, in general, were soon followed by the adaptation to fruit and vegetable crop production of copper phosphate, copper silicates, basic copper sulfates, copper oxychlorides, cuprous oxide, and mixtures of some of these. Industry became interested in these compounds and their possibilities were quickly recognized. Their manufacture was put on a rather substantial scale and these materials now find their way to producers in considerable volume.

The search for organic fungicides began soon after the original work with inorganic copper salts. In the course of these early experiments, the fungicidal properties of a number of copper salts of the organic acids were studied such as the acetates, maleates, citrates, tartrates, ox-

alates, etc. During this time a series of copper alkyl xanthates were studied. These had been prepared by the Insecticide Division of the U. S. Bureau of Entomology and Plant Quarantine for insecticide tests. This was followed by an arrangement with the B.E.P.Q. to furnish many of the organic chemicals that were being synthesized and tested for insecticidal properties, in order that these materials might also be tested for fungicidal value.

Rubber Products Tested

AT this time the experimenters became interested in the possibilities of many of the rubber chemicals that were being used as accelerators and antioxidants in the preparation of rubber products. These chemicals were standardized and already in supply and their price was in line with what agriculture could afford. Since no published data were available at that time, the experimenters were not aware of the progress made by W. H. Tisdale[17] with these compounds. A great many rubber chemicals were tested and much interest was aroused with the dithiocarbamates. While work was being done with them, M. H. Moore,[11] in 1936, and R. W. Marsh,[8] in 1938, disclosed their interest in these chemicals. Moore tested tetramethylthiuram disulfide without much success, and Marsh reported negative results with the zinc diethyldithiocarbamates. The Roberts group, on the other hand, clearly established the fungicidal properties of the metallic methyldithiocarbamates and indicated the iron, zinc, and lead derivatives of methyldithiocarbamate to be promising fungicides. The group followed this up closely with the original field tests and published what proved to be the first paper defining these compounds as fungicides and discussing their possibilities. In conjunction with the Bureau of Entomology and Plant Quarantine the group also developed morpholinethiuram disulfide as a fungicide. The possibilities of making these important fungicides cheaply in the spray tank were also disclosed, but thus far such a procedure has been employed only sparingly. J. W. Heuberger[4] discovered the fungicidal properties of the ethylene bis derivatives of dithiocarbamic acid and devised the scheme of reacting the soluble sodium ethylene bis dithiocarbamates with zinc sulfate in the spray tank to make the fungicide zinc ethylene bis dithiocarbamate. Tisdale's original work indicating the fungicidal possibilities in this group of chemicals and the work of others has now brought into focus the importance of this group of materials as fungicides. The dithiocarbamic acid nucleus of the molecule lends itself to any number of substitutions and a great deal of manipulation is possible. At the present time, tetramethylthiuramdisulfide, iron and zinc dimethyldithiocarbamate, sodium, zinc and manganese ethylene bis dithiocarbamate are being manufactured and distributed to the fungicide trade.

Cooperation with the Bureau of Entomology and Plant Quarantine has been very fruitful and has led to the employment of a large number of compounds in the fungicide tests of the Roberts group of experimenters. These compounds have, almost entirely, been purely organic in nature, containing no metals but occasionally including nitrogen or sulfur and the halogens. Some 800 of these compounds have been studied intensively. For the most part, they have proved to be of no fungicidal value. A small percentage of them have been observed to possess fungicidal properties and these are being studied further in field tests. The results obtained from a study of one group of 512 compounds obtained from this source is now in manuscript form and will soon be published. However, nothing spectacular has developed, so far, from these studies.

Recently, the biotics and the hormone-like chemicals have aroused sufficient interest that research has been aligned to explore their possibilities thoroughly.

These research groups have also worked very closely with the chemical industry and have studied many of their products. Industrial laboratories and their storage rooms are full of interesting chemicals. Many of these chemicals are now being studied for their possible adaptation as insecticides and fungicides. It is now a common practice for industrial concerns to have such studies made of these chemicals through fellowships and even in testing laboratories of their own. Several of the State Agricultural experiment stations and private foundations have given considerable time and effort to pioneering

Hundreds of new materials tested over the years by U.S.D.A. and others. History of fungicides dates back to Millardet's discovery of bordeaux. Much research remains yet to be done to control plant diseases.

in the developing of methods for studying these compounds as fungicides. Under the leadership of such men as Horsfall,[6] Heuberger, F. L. Howard,[7] and S. E. A. McCallan[9] fungicide testing has become a real science. Many of the industrial fellowships find their way into various institutions through the Crop Protection Institute. At present, probably most of the findings of research conducted on chemicals frequently finds its way into the hands of other investigators for secondary testing. Occasionally a finished product is given over to field evaluation. In this way the research group has worked in collaboration with many of the large chemical concerns and frequently their representatives seek solution of their problems. Because of this, the research men have had close contact with the industrial phase of this work and have come to rely on the cooperation of these firms and their ability to help.

As the picture is painted now, the combined efforts of the industry, the Department, the experiment stations, and the private foundations have resulted in:

1. The will to cooperate towards a common solution.
2. The establishment of a scientific and practical system of testing chemicals to discover their fungicidal properties.
3. The cooperation among experiment station, Government and industrial staffs in conducting and orienting field studies.
4. The appointment of committees to study the variable results obtained in all parts of the country.

The combined efforts have established new fungicides in the following groups of chemicals:

1. Copper (silicates, basic sulfates, basic chlorides, oxides, organics).
2. Mercury (phenyl derivatives, alkyl derivatives).
3. Dithiocarbamates—
   Thiuram disulfides (tetramethyl, morpholine).
   Metallic methyl derivatives (iron, zinc, lead).
   Metallic ethylene derivatives (sodium, zinc, manganese).
4. Clorinated quinones (tetrachloroquinone).
5. Chlorinated naphthoquinones (dichloronaphthoquinone).
6. Metallic quinolinolates (copper and zinc).
7. Quaternary compounds (combination of fatty acids and coal tar residues, such as quinoline, isoquinoline, picoline, etc.).
8. Glyoxalidines (fatty acid derivatives).
9. Nitrated phenols (dinitro derivatives).
10. Chlorinated phenols (phenates).
11. Chromium salts (double salts with other metals).

A few of the compounds in every one of the above groups appear to be promising and some of them are beginning to be mentioned in the spray calendars issued by the various agricultural experiment stations. A few have been used successfully against specific diseases and it is for such use that their greatest development appears to be taking place. The great bulk of fungicide sales, however, is still confined to the copper and sulfur groups.

Definite progress has been made. The testing of chemicals for fungicides has been put on a very high and practical plane and all the interested parties are now organized. Pioneering work is always slow, but that stage is now behind us and from now on results should be achieved at an accelerated pace.**

Bibliography

[1] Cordley, A. B.
1909. Spraying for peach fruit spot.
Oregon State Agr. Exp. Sta. Bul. 106: 1-15.

[2] Fairchild, D. G.
1894. Bordeaux mixture as a fungicide.
U. S. Dept. of Agr. Div. of Veg. Path. Bul. 6:1-53.

[3] Galloway, B. G.
1891. Field work of the year in treating plant diseases.
Report of the Secretary of Agriculture, 1892: 216-231.

[4] Heuberger, J. W., and Manns, T. F.
1943. Effect of zinc sulfate-lime on protective value of organic and copper fungicides against Early Blight of potatoes.
Phytopathology 33 (abstract) p. 1113.

[5] Horsfall, J. G., and Newhall, A. G.
1932. Red oxide of copper as a dust fungicide for combating damping off by seed treatment.
New York State Agr. Exp. Sta. Bul. 615:1-26.

[6] 1941. Biological assay of protective fungicides.
Chronica Botanica 6 (13): pp. 292-294.

[7] Howard, F. L., and Keil, H. L.
1943. Cationic quarternary ammonium compounds as fungicides.
Phytopathology 33 (abstract), p. 1115.

[8] Marsh, R. W.
1938. Some applications of laboratory biological tests to the evaluation of fungicides.
Ann. Applied Biol. 25: 583-604.

[9] McCallan, S. E. A.
1930. II. Testing protective fungicides in the laboratory.
New York (Cornell) Agr. Exp. Sta. Memoir 128: 75 pages.

[10] Millardet, A., and Gayon, U.
1885. Traitement du mildious par le melange de sulfate de cuivre et le chaux.
Jour. Agr. Prat. 49 (t.2): 707-710.

[11] Moore, M. H., Montgomery, H. B. S., and Shaw, H.
1936. Field trials, in 1936, of the fungicidal and phytocidal properties of certain new chemical preparations.
East Malling (Kent). Res. Sta. Ann. Rpt. 24: 259-266.

[12] Nikitin, A. A.
1937. Zeolitic copper compounds as fungicides.
Doctorate Thesis, Columbia University, New York, N. Y.: 1-73.

[13] Scott, W. M.
1907. Self-boiled lime-sulfur mixture as a promising fungicide.
U. S. Dept. Agr., Bur. of Plant Industry, Circ. 1:1-18.

[14] Scribner, F. L.
1886. Fungus diseases of the grape.
U. S. Dept. Agr., Div. of Veg. Phys. and Path. (Botanical Div.) Bul. 2:1-136.

[15] Sessions, A. C.
1936. Fungicide adjustment: preparation to meet requirements of disease and host.
Ind. and Eng. Chem. 28:287-290.

[16] Swingle, W. T.
1896. Bordeaux mixture: its chemistry, physical properties and toxic effects on fungi and algae.
U. S. Dept. Agr., Div. of Veg. Path. Bul. 9:1-37.

[17] Tisdale, W. H., and Williams, I.
1934. Disinfectant. (U. S. Patent 1,-972,961, Sept. 11, 1934)
U. S. Patent Office Index of Patents p. 740, Washington, D. C.

[18] Waite, M. B.
1910. Experiments on the apple with some new and little known fungicides.
U. S. Dept. Agr., Bur. of Plant Industry, Circ. 58:1-19.

Possible Food Contamination From Insecticides?

by

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INSECTS are involved in food sanitation in a number of important ways. Food may be contaminated not only by the presence of whole insects, insect fragments, insect frass or debris, bacteria, molds, and Protozoa, but also by insecticide residues. For these reasons it seems desirable to give brief consideration not only to the contamination of food by insects but also by insecticides.

Insects not only destroy tremendous quantities of food, but their presence in or on foods affects the appearance and marketability of the material and often induces spoilage through bacterial action. Furthermore many dangerous organisms, including the causative agents of dysentery, diarrhea, cholera, and typhoid, are carried to food by insects. In a few instances the insects themselves, when ingested, may be deleterious to health. For example, the ingestion of certain mites and fly larvae with meat, dairy products or vegetables results occasionally in digestive disturbances, vomiting, severe pain, diarrhea and other symptoms. In general, however, the ingestion of insects themselves causes no ill-effects whatever. As a matter of fact many insects are used as a food for man as in the case of grasshoppers as a regular diet of certain natives in Africa, fly pupae as a staple dish of the Paiute Indians in the western United States, and caterpillars, "gusanos de maguey," as a delicacy in Mexico.

Insects in Food Contamination

Insects in Cereals.—Grains and cereal products are infested by many kinds of insects and mites. Infestation often begins in the field and may proceed through trade channels to and including the pantry shelf. The loss in the United States has been estimated at 5% of the grain crop annually. In 1947 the world loss of grains and rice alone was estimated to be 33,000,000 tons.

In some countries flour and meal heavily infested with various grain beetles are eaten with no compunction. In the United States, however, contamination of cereal products by insects or insect fragments is used as an index to undesirable sanitary conditions. Of course one small rice weevil in passing through the milling processes may become several hundred insect fragments.

Research is proceeding in several quarters on methods of preventing the insect infestations of grain which lead to condemnation of flour or result in heavy losses of the grain before it reaches the mill. Investigations by industry and by the U. S. Department of Agriculture on new insecticides and fumigants, methods for their application, storage methods and facilities, grain drying, fumigation and on general sanitation of bins, elevators, cars, trucks and ships are now under way.

An interesting result of research in this field by the Bureau of Entomology and Plant Quarantine is the recent discovery by J. C. Frankenfeld of a method of detecting insect infested grain even when the insect eggs within the kernels have not hatched. This is done by applying a dye such as acid fuchsin to a sample of the grain. The gelatinous plug placed by the insect over the egg puncture takes on a deep wine color that makes it conspicuous. This discovery puts in the hands of grain dealers a ready means of detecting inconspicuous infestations and may compel better grain sanitation and storage to avoid loss through down-grading of the product. In turn, the effort to meet the high standards of food authorities and millers may lead to the use of more insecticides and greater chances of chemical contamination.

DDT and other newer chlorinated hydrocarbon insecti-

cides are highly effective in destroying most of the grain infesting insects. Applying a residual DDT spray to grain bins, and to trucks and cars in which grain and cereal products are transported will do much to prevent infestations. Treatment of sacks with DDT also destroys insects in the flour contained therein and prevents infestation even when the flour is stored in warehouses. We have found, however, that where flour sacks are dipped in a 5% DDT solution the flour next to the sack may be contaminated to the extent of 14 to 344 p.p.m. Possibly pyrethrum - piperonyl combinations, which are less toxic to higher animals and are effective in killing stored product insects but less persistent, may come into the picture for some of these purposes.

Mixing 3% DDT in magnesium oxide with wheat at the rate of ½ ounce per bushel of grain prevents infestation. Even though a large percentage of the insecticide may be removed by special cleaning processes, however, the Bureau of Entomology and Plant Quarantine has recommended such insecticidal treatment for seed grain only. Furthermore the Bureau has found that as little as one ounce of harmless magnesium oxide per bushel will prevent insect infestation.

The proper use of several fumigants, including ethylene dichloride - carbon - tetrachloride, ethylene oxide-carbon dioxide mixture, hydrocyanic acid gas, chloropicrin, or methyl bromide on grain and flour in storage presents no particular residue hazard. However, products treated with these materials are subject to reinfestation soon after treatment.

Drying wheat so that its moisture content is below 9% will reduce insect infestation because pests deveop very slowly or not at all in grain that is kept dry. Packaging in well sealed containers will help to prevent contamination of various processed cereal products, if the product is entirely free of insects when packed.

Dried Fruit Problems. — Contamination of dried fruits by insects and mites is common. Some of it is due to the soiling by excreta and vomitus of insects, especially flies, while the fruit is on the trees or vines or while it is drying. The dried fruit may become infested in storage with several of the cereal-infesting species of insects and several kinds of mites including the common cheese mites. Field sanitation, care in handling, and destruction of infestation in and around packing plants are a material aid in reducing infestations.

BULLETIN

Subsequent to the preparation and delivery of this paper, new and significant developments have come about. Among these is a recent policy declaration by a group of food processors, in which is stated the conditions under which fruits and vegetables will be purchased. The statement, circulated through trade channels and not for publication, said that the food processors were "forced to adopt a policy of refusing acceptance of certain . . . pesticides as residues until more was known about their health hazards."

Processors will not purchase fruit unless the fruit has received insecticidal applications according to "existing state recommendations as of March 1, 1949," so long as the last application of those producing stable residues shall not be made later than 30 days prior to harvest (Parathion, DDT, TDE, or DDD, chlordane, chlorinated camphene, Methoxychlor). Those pesticides producing unstable residues should not be applied later than two weeks prior to harvest (HETP, TEPP). In those states where chlordane and chlorinated camphene (toxaphene) are recommended, all fruit purchases will be subject to special laboratory analysis before acceptance."

Purchase of vegetables will follow the U.S.D.A. recommendation of NO RESIDUE ON EDIBLE PORTIONS AT TIME OF HARVEST.

"There are three pesticides, benzene hexachloride, organic mercury and selenium compounds, which we will not knowingly accept in any detectable trace by flavor, odor or chemical determination," the statement says, and concludes with "Final acceptance of all purchases of fruits and vegetables will be subject to our laboratory analysis and approval."

Fumigation of infested dried fruit with hydrocyanic acid gas or methyl bromide has led to the absorption in a few instances of the toxic materials on the moist fruit to a hazardous extent, but it soon passes off. The introduction of methyl formate into the containers, as they are sealed, has been found efficacious in destroying any living pests that may have gained entrance in the packaging process. Proper packaging and storage in well sanitated warehouses, to which residual insecticides have been applied, reduces chances of insect contamination and consequent losses.

Fruits and Vegetables. — The problem of controlling insect pests of fruits and vegetables, and at the same time avoiding any hazard from insecticide residues is still before us, in fact it has become more acute since the discovery and development of the highly effective chlorinated hydrocarbon and phosphorous insecticides. The factor of persistence that makes a number of these materials so valuable as insect killers, increases the chance of insecticide contamination of food products.

The following may serve as examples of residue problems and how they are being met. The persistence of DDT and other insecticides on fruits and vegetables and the difficulty of removing these residues with known washing procedures has led the Bureau of Entomology and Plant Quarantine to recommend that these insecticides not be applied to leafy vegetables, and that they not be used on cabbage and similar crops after the heads begin to form.

In the use of DDT on apples and pears in the Northwest and East, it is recommended that 2 to 4 applications of ½ to 1 pound of actual DDT, in the water dispersible form, per 100 gallons of water be applied, the

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last at least 30 days before harvest. Under this schedule the residue has been held well below 7 p.p.m., usually 1 to 4 p.p.m. In the Middle West it has been found that codling moth control requires 6 or 7 cover sprays, each containing ¾ pound of DDT per 100 gallons. Growers have found that even with this number of applications the residues are usually below 7 p.p.m. if the last spray is applied at least 30 days before harvest. No application should be made after August 15 and any after August 1 should not exceed 8 ounces DDT per 100 gallons. Oil used with DDT sprays increases the residue and we are advising against this combination especially in late-season applications.

DDT has been found very effective in controlling the destructive grapeberry moth and leafhoppers on grapes. With the heavy spray program necessary to give complete control of these pests, i.e., 6 sprayings, from prebloom to 6 weeks before harvest, a residue of 2.4 to 11.0 p.p.m. of DDT has been found on the fruit. When wine was made in the usual way from the grapes it was found to contain 1 to 1.2 p.p.m. of DDT at the first racking and at the final racking of the finished wine the following June no DDT was present in either the non-filtered or filtered product. The DDT was concentrated in the pomace, 18.6 to 21.0 p.p.m.

The question of absorption and or translocation of insecticides in plant tissues has been investigated to some extent. There is no evidence that detectable quantities of DDT are taken up from the soil or absorbed and retained in the plant tissues. Evidence is not so clear cut in the case of benzene hexachloride for it is well known that in some instances heavy dosages of this material applied to soils for the control of wireworms have caused potatoes grown in such soils to have an objectionable odor and flavor. The application of benzene hexachloride as a spray to the potato vines has been reported as affecting the tubers in the same way. Similar effects have also been observed on carrots and other root crops. Just how these effects are produced is not known, and there is no evidence that the chemical itself is present in the tubers or roots.

Among the phosphorus insecticides, hexaethyl tetraphosphate and its insecticidally active constituent, tetraethyl pyrophosphate, are receiving some attention because of their efficacy against certain arthropods, such as aphids and mites, that are not satisfactorily controlled with DDT. Although these materials are extremely toxic to man, they hydrolyze rapidly after being applied, with the formation of water soluble products, and hence present no residue problem.

Another new insecticide, parathion, is showing much promise as a mite and insect destroyer. It also is extremely poisonous to higher animals, but it is only moderately persistent and therefore the residue problem may not be a too serious one. Analyses of apples, pears, and peaches, sprayed different numbers of times and with different strengths of parathion by entomologists of the Bureau of Entomology and Plant Quarantine, show that high percentages of the parathion residues on fruit volatilize or weather-off within a period of two weeks after application, and that most of it is gone within a period of four or five weeks. There is little to indicate that there is any danger from the accumulation of parathion in the flesh of fruit. If there is a period of a month or more between the time of the last application and harvest, parathion residues on harvested fruit are unlikely to exceed 0.5 p.p.m. following any schedule of applications likely to be used. Residues not exceeding this amount have been found on fruit when as many as six applications of 2 pounds of a 25 percent wettable powder per 100 gallons were applied. Spray schedules involving up to four applications of 2 pounds of a 25 percent wettable powder per 100 gallons are not likely to give residues exceeding 0.1 p.p.m. If lighter schedules are used, residues will be correspondingly less. The Bureau of Entomology and Plant Quarantine is not recommending the use of parathion on fruits until more information has been obtained on residue hazards.

Removal of Debris

DETECTION and removal of insects and insect debris from processed fruits and vegetables is an important problem which has received little research attention. It is recognized, however, that industry has been much concerned with this problem as well as with the elimination of insecticide residues, and has been endeavoring to find answers to these perplexing problems. The presence of insects and insect debris is of particular importance in canned and frozen leafy vegetables, peas, and berries. These difficulties arise largely from infestations of aphids, thrips, mites, caterpillars, and weevils that infest the growing crops and the parasites and predators which usually accompany insect infestations.

With all that can be done economically with crop rotation, elimination of alternate host plants and other cultural methods, coupled with a moderate use of insecticides, some degree of insect infestation of the produce going to the processor cannot be avoided. Although the presence of insects in such processed food would probably in no way affect the consumer adversely, no one likes to find a worm in his canned corn, and such occurrences cause

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Texas Entomological Society Discusses

TOXICITY of INSECTICIDES

THE Texas Entomological Society met at the Raleigh Hotel, Waco, Texas, February 17 and 18, with some 200 members and guests attending. The meeting was featured by several papers reporting highly successful pest control work on two important Texas agricultural crops, cattle and cotton. On the latter, early season dusting was given enthusiastic endorsement, with reports that it may be expected to increase cotton yields up to fifty percent. A trend toward use of sprays rather than dusts for cotton pest control was noted. Improved control of pests attacking cattle was reported through use of the new organic insecticides, which seem to be responsible for a switch in emphasis from dipping toward spraying. However, the report that the new organics tend to accumulate in milk when used on dairy cattle, that they are hazardous for use around young cattle, and that they are stored in the fat of cattle following the animals' eating of fodder on which the insecticides have been used, all combine to indicate the necessity for extreme caution in their use. It was stated by representatives of the U.S.D.A. at the meeting that previous recommendations for use of some of the newer insecticides may shortly have to be revised, in view of these public health dangers.

The new president of the Society for the coming year is Cameron Siddall, Bryan, Texas, manager of the Southwestern Division of Pennsylvania Salt Manufacturing Co. of Washington. He succeeds A. V. Little, Department of Entomology, Texas A & M College, College Station, Texas. The new vice-president is H. G. Johnston, head of the Department of Entomology at Texas A & M. L. F. Curl of the Pink Bollworm Division, B.E.P.Q., San Antonio, was re-elected secretary-treasurer. It was announced that the 1950 meeting will be held in Houston.

DDT and TDE in Milk

ONE of the most significant papers was presented by H. V. Claborn entitled "The Excretion of DDT and TDE in Milk from Cows Treated with these Insecticides for Fly Control." H. F. Beckman and R. W. Wells were co-authors. In experimental work DDT and TDE were sprayed as 0.5% emulsions in the following ways: 2 quarts per animal over the entire body; 1 quart entire body; 1 quart over dorsal half; 1 quart ventral half. As an accompanying treatment dairy barns were sprayed with a 5% residual spray.

The average contamination of the milk was 0.221 ppm. On the basis of these figures it was computed that a person drinking one quart of milk daily for four months would consume a total of 24 mg. of DDT.

Individual treatments with DDT caused the appearance of more insecticide in the milk than was noted after spraying with TDE. It was necessary, however, to apply TDE more frequently to secure the same degree of fly control. Thus the average contamination for the season for both insecticides was about the same.

Dr. R. D. Radeleff delivered a paper "Toxicity of Chlorinated Insecticides Applied to Livestock" which had been given previously at the A.A.E.E. meeting in New York in December. (See *Agricultural Chemicals*, Jan., 1949, pgs. 22-23 for resume). Co-author was R. C. Bushland. Dr. Radeleff emphasized that with the use of the new chlorinated insecticides there is a very narrow range of safety. Sprays are safer than dips, he indicated, but the fact must still be faced that double the concentration needed to give adequate insecticide control can well be toxic, particularly to young farm animals.

Earlier on this same program Dr. E. W. Laake had reported on "Livestock Parasite Control Investigations and Demonstrations in Brazil," conducted while on leave from the B.E.P.Q. as consultant for the American International Association for Economic and Social Development. According to Dr. Laake, Brazil is still in the "horse and buggy" stage so far as insecticide usage goes. Cattle are badly infested with ticks and grubs, one of the worst pests being the grub, *Dermatobia Hominis*, which has fortunately never spread to the United States. None of the newer insecticides had been used in Brazil prior to his visit, dipping being practiced almost exclusively. Even use of highly concentrated dips at fifteen or even ten day intervals gave very poor control, the ticks apparently building up an immunity to the action of the dip. The Brazilians were amazed, he reported, at the results obtained with toxaphene,

DDT and BHC. Practically 100% control of ticks was obtained with these insecticides for two weeks after spraying. Attempts to control *Dermatobia Hominis* with derris were unsuccessful.

"Testing New Insecticides for the Control of Cattle Grubs" was the topic of a paper by O. H. Graham and R. Richards. Cube and derris powders proved superior to derris extractives. Good wetting was found to be essential, and to get this it is desirable to use at least 400 lbs. pressure and to hold the sprayer very close to the animal's back. Addition of a wetting agent was found not to be helpful. Tests with chlorinated insecticides proved negative.

Two papers on horn fly control were included, "County Horn Fly Control With DDT" by Charles L. Smith and D. E. Gates, and "Field Tests of Insecticides and Spraying Methods for Control of Horn Flies in Dairy Herds," by W. S. McGregor and J. M. Dreiss.

Mr. Smith reported failure in their attempt to eradicate horn flies on a county-wide basis. They did achieve an excellent degree of temporary protection, however, twelve weeks with the first spraying and five to nine weeks with the second. Reduced control on second spraying was traced to higher temperatures, more flies emerging, and more hair on the sprayed animals. County-wide cooperation near the 100% level, is necessary, he said.

Mr. McGregor reported successful control of horn flies in his test work with DDT, methoxy analog of DDT, TDE and toxaphene. Average protection for the four materials tested was 41 days, 40 days, 34 days and 34 days respectively. Underline spraying was found to be not so effective as either overall spraying or top-line spraying.

Early Cotton Spraying

A SECOND important section of the program was concerned with insect control on cotton, with a report by K. P. Ewing on "Early-Season Cotton Insect Control Experiments in Wharton County, Texas" highlighting this part of the program. Some 6,000 acres were dusted for boll weevil control, using 20% toxaphene, 10 pounds to the acre. Two applications were made. The dusted cotton reached maturity three weeks earlier than undusted checks, there were 79% more blooms in the dusted cotton, and a 45% gain was reported in yield. Dusting against the fleahopper, using a 10% toxaphene dust, two applications gave seasonal control. Blooms were three times as numerous as in the check plots, and a 48% gain in yield was obtained. On the basis of this experimental work, early season dusting is being strongly recommended to farmers in areas where insects cause damage every year.

Cameron Siddall
Named Society President

C. R. Parencia, Jr., co-author with Mr. Ewing of the above paper, delivered their joint report on "Organic Insecticides Applied as Sprays and Dusts for Boll Weevil and Bollworm Control." In one experiment mixtures of DDT and toxaphene and of DDT and Compound 118 applied as sprays each gave satisfactory control of the boll weevil, although the control was not quite as good as that secured from 20 percent toxaphene dust. In several experiments 10 percent chlordane dust gave boll weevil control approximately equal to that obtained with 20 percent toxaphene and with a mixture of DDT and benzene hexachloride containing 3 percent of the gamma isomer. Concentrations of less than 10 percent of chlordane alone or in mixtures with DDT in most instances did not give satisfactory weevil control. Chlordane alone failed to control bollworms and in some experiments its use resulted in increased infestations over that of the untreated check. A mixture containing 10 percent of chlordane and 5 percent DDT gave satisfactory control of boll weevil and bollworms. In one experiment compound 118 applied as a dust at an average rate of 0.4 pound of the active material per acre gave control of the boll weevil but failed to control the bollworm. Satisfactory control of both insects was obtained with this material in a dust mixture with DDT.

Lime-free Arsenate Tested

H. A. Dean of the Department of Entomology of Texas A & M. gave a report on "Insecticide Tests for Boll Weevil Control" which indicated that a special lime-free calcium arsenate, mixed either with parathion or gamma BHC and 20% toxaphene-sulfur was particularly effective against boll weevil, proving superior to a 3-5-40 BHC-DDT-sulfur mixture and to a 10-5 chlordane-DDT-sulfur mixture, at least under the particular conditions encountered in this test. The weather was hot and dry, there was a heavy migration of weevils, and fleahoppers and bollworms did not develop to injurious numbers.

C. F. Stiles reported on "Trends in the Use of Cotton Insecticides on Oklahoma Farms." He indicated that use of toxaphene, the 3-5-40 BHC-DDT-sulfur mixture and straight DDT gained substantially last season, paralleling a decline in use of calcium arsenate, paris green and

straight sulfur. In the discussion that followed, it was brought out that the same trend has been reported in Texas, with use of calcium arsenate dropping last year to only about a million and a half pounds, down eighty to ninety percent from the figures of a few years back. Use of toxaphene has risen to over 5,000,000 lbs., and of the 3-5-40 BHC-DDT-sulfur mixture to over 7,000,000 lbs.

L. F. Curl of the Pink Bollworm Division of the B.E.P.Q. reported on "The Pink Bollworm Situation," concluding a series of three papers on the bollworm in which C. A. Richmond reported on "Hibernation of the Pink Bollworm in the South Plains Area of Texas" and O. T. Robertson talked on "Field Plot Insecticide Tests for Pink Bollworm, Boll Weevil and Thrips Control." Mr. Curl observed that pink bollworm is one of the few insect pests that the government is still trying to keep in check with regulatory measures. At the end of thirty years of quarantine controls, it has been confined to four states, and there has been no further spread during the past year, rather a contraction of the infested area. DDT was the first insecticide to give any effective control of bollworm, approximately 65% reductions in population being obtainable with 10% DDT — 2% BHC — 40% sulfur.

Toxaphene Non-toxic to Bees

NEVIN WEAVER of the Department of Entomology of Texas A & M gave a comparatively clean bill of health to toxaphene in his report on "The Toxicity of Certain Insecticides to the Honeybee." Toxaphene, in contact tests, resulted in only 5% mortality when applied at a rate of 30 lbs. per acre. BHC, 3%, was quite toxic, BHC-DDT-sulfur (3-5-40) slightly more so, and DDT alone of medium toxicity. Results with chlordane were variable.

Negative results were reported by D. E. Howell of Oklahoma A & M in a search for an insecticide to control horse fly populations by aerial spraying. Tests with DDT, chlordane and

H. G. Johnston
New Vice-President

toxaphene all proved ineffective in reducing horse fly populations.

A general discussion of "Progress in Development of Spray Equipment for Aircraft" was presented by Kenneth Messenger, agricultural engineer with the B.E.P.Q., Washington. He discussed a number of practical spraying problems of particular interest to airplane dusters, such as relationship between speed of cross wind and spraying altitude for optimum swath, the variation desirable in drop size with change in material being sprayed, temperature, pressure, speed of ship, cross wind, etc. Drop size should be thought of, he emphasized, in terms of volume rather than in terms of diameter of drop. Volume varies, not directly, but rather with the cube of the diameter. A 5 micron drop, he observed, in the absence of any cross wind, will take an hour to drop ten feet, but with cross wind drift it may be miles away before it reaches the ground.

A series of three papers was presented by George P. Wene on pest control problems involving truck crops. A 1% solution of DDT in light mineral oil gave good control of the corn earworm, he reported. It must be applied when the majority of the silks are fertilized, but before any of the silks start drying. To minimize burning of the corn by the oil, experiments were carried out with a 1% DDT emulsion in 10% oil. The DDT was applied by hand sprays. No trace of DDT was found in the ears at harvest time. Airplane dusting proved unsuccessful.

Texas farmers have long needed a good insecticide for the control of the melon aphid, said Mr. Wene. They have been using nicotine, which gives spot control, but with no residual effect.

A report on the 1948 Screw-worm Survey of the Western Area of the U. S. was presented by Dr. E. W. Laake. There was only a light screw-worm infestation in 1948, he reported. Use of Smear No. 62 as a prophylactic was quite helpful, he indicated, and there was also some opinion, which he declined to endorse, that spraying of the new insecticides may have been a factor. Complete wiping out of the overwintering areas in the United States would accomplish but little in Dr. Laake's opinion, for migration from Mexico each spring is inevitably rapid and deep.

Grasshopper Recommendations

J. M. LAXDRUM, project state leader on grasshopper control, Waco, discussed use of the new chlorinated insecticides. Some dissatisfaction was experienced with their use last year, he said, resulting from the fact that in some cases they were used too late. An intensive educational campaign has been started this year to teach farmers how to use them correctly. They can do a good job in one application, he indicated, eliminating the extensive re-use necessary with the wet baits formerly used. Toxicity hazards should be borne in mind. Chlordane is recommended as a spray at one pound per acre, and as a dust at one and one-half pounds per acre. Toxaphene is

recommended at one and one-half pounds per acre as a spray and at two pounds per acre as a dust. For later season applications slightly heavier dosages are suggested, since these insecticides tend to break down under the influence of heat.

I. J. Becnel of Freeport Sulphur Co., New Orleans, spoke on "Educating the Farmer Regarding Insect Control." He suggested wider use of demonstrations to show the farmer what to use, how to use it, application equipment, etc.

In a paper discussing "Effect of Sulphur When Used as a Diluent for Organic Insecticidal Mixtures," R. L. Hanna of the Department of Entomology of Texas A & M. reported on a series of tests, some of which indicated that use of sulphur rather than the usual clay diluent improved the toxicity of various insecticides.

A motion picture shown during the cotton program, "Five Bandits of the Cotton Crop," pictured the life cycles of and the losses resulting from five important cotton pests, the boll weevil, the bollworm, the cotton aphid, the cotton fleahopper and the cotton leafworm. The picture, prepared by the U.S.D.A., was shown by E. E. Ivy.

Among the distinguished guests present at the meeting was Manuel Alcazar, in charge of the Juarez District of the Mexican Department of Agriculture, who spoke briefly. Also present were Dr. F. C. Bishopp and Dr. H. L. Haller of the U. S. Department of Agriculture, Washington.

Outlook Called Promising for Expanded Sale of Agricultural Chemicals in the Southwest

RAPID expansion in the market for agricultural chemicals is looked for in Louisiana, Texas, Oklahoma and the southwest over the next few years. This, at least, is the opinion of a group of distributors of and dealers in agricultural insecticides, fungicides, fertilizers, weed killers, etc., interviewed by a representative of *Agricultural Chemicals* in a trip through this area over the course of the past few weeks. The market is expanding, and has a large potential. The only question seems to be "Will this potential be realized?" The threat of falling farm prices seems to be the most important dark cloud on the horizon, and one that could quite possibly result in some contraction in the market over the next year or two, rather than a continuation of the upward sales curve, should prices of farm products continue to drop.

First to the bright side of the picture. The market for cotton poisons, most of these distributors feel, has just been tapped. The operators of the larger farms were the first ones to turn to the use of toxaphene, BHC and DDT to control the perennial pests of the cotton crops, boll weevils, the cotton bollworm, fleahoppers, aphids and the cotton leafworm. So successful has the use of these new chlorinated insecticides been, and so much wider has been the extent of crop protection than with the once standard calcium arsenate, that more and more of the smaller cotton farmers are following the trend toward use of these higher priced, but more effective, cotton insecticides. *Early* season spraying has been given a big boost this year, with the release of test results indicating that substantial increases in yield—up to fifty percent—can be anticipated from early insecticide use. Farmers have been quick to see the economy of spending twenty to thirty dollars per acre to get back sixty or seventy in the form of increased cotton yield.

A big increase in sales over the next few years is also looked for on defoliants. Mechanical picking seems to be gaining rapidly, and use of a defoliant is a definite prerequisite to the introduction of the mechanical picker. One of the most popular and best selling of the defoliants now being used is stated to have a nitrogen content of better than twenty percent, justifying a large part of its sales prices from the angle of increased fertilizer value alone.

Weed killers are already selling in substantial volume, and the market is growing from week to week. There are hundreds of thousands of acres of sagebrush in western Texas, one dealer pointed out, where a tremendous quantity of weed killer can be employed effectively, opening up a tremendous market for years to come.

An expanded sale of fertilizers in this area, waits, of course, as it does in most any other part of the country, only on the availability of more of the basic fertilizer materials, particularly the nitrates. Calling on one dealer in fertilizers, insecticides, etc., *Agricultural Chemicals'* representative was met by the typical question "You don't know where I can get a car of ammonium sulfate, do you?" Wish we might have been able to tell him. He and dozens of others. But, inevitably the day will come, when it will be running out of our ears again.

As indicated above, the big question for the future is "What is going to happen to prices of agricultural products?" With cotton at thirty cents, it pays very well to spend money for cotton poisons to boost yields. With cotton at half this figure, it would obviously not be as attractive a proposition. And it is worth noting that cotton has already dropped sharply from its peak, while insecticides are still selling about where they were a year or so ago.

New Laws Threaten 2,4-D

ANOTHER threat to a further expansion in sales lies in the proposed new legislation in some of these southwestern states directed against careless use of 2,4-D. Louisiana already has a state law that restricts greatly the use of herbicides, and an even more stringent measure has been introduced in Texas which would practically prohibit the use of 2,4-D. That the trend toward seeking the solution to the herbicide problem is being sought in legislation rather than education, at least by some state legislators, seems to be borne out by the introduction of another such bill in Arkansas which would make it a violation to sell, use or process 2,4-D "or other economic poisons or devices which in any way would endanger public health or safety or would injure plant or animal life . . ." and would require the registration and bonding of persons handling economic poisons or devices.

Needless to say, measures such as these could do much to reduce the market for weed killers. And unless such stringent legal controls as these can be headed off, and the answer found in education of users to the safety measures necessary in connection with 2,4-D use, distributors of agricultural chemicals in this area must anticipate a smaller rather than an expanded market for weed killers.

"Know How" Necessary

AS a matter of fact, a serious attempt to educate not only users, but dealers and distributors as well, on the need for extremely careful and intelligent use of the new insecticides, fungicides and other agricultural chemical specialties seems definitely to be called for. A number of dealers interviewed were apparently completely confused about the new products that have been introduced over the course of the past few years. Their knowledge of the field very apparently dates back to the days when calcium arsenate was the standard cotton insecticide and lime sulfur and Bordeaux mixtures were the universal and accepted fungicides.

"I'm getting out of the market completely until the situation becomes more stabilized," said one distributor. "We once had a good business in calcium arsenate. Sold as much as 150 cars a season. Everyone knew what it was and how to use it. It moved in big volume, and we made a fair profit, without needing to be insecticide specialists. Now they bring out a new insecticide every few weeks, and each new one is better than the last. But does the manufacturer supply us with any information on how to use it—any sales aids, any booklets to hand out to the farmer to tell him how and when to use it? He does not! Selling has been so easy over the past few years, that products have been bought rather than sold. These new products may be swell, superior to anything we have ever offered before, but they're no use without full directions on how to use them."

Other complaints dealing with the price structure of the resale market were common. Complained one former large distributor, "We have withdrawn from the market the past two years. And we are staying out until the situation is corrected. The price picture is chaotic. In many cases manufacturers are selling direct to custom sprayers and large users at prices below those quoted to dealers and distributors. There are far too many small compounders—back yard operators, we call them. The folks that introduced DDT sold it everywhere and anywhere. We're not anxious to give up our insecticide business which we built up over a period of many years, but we are getting out of the market until this price situation is straightened out again and we can make some money handling insecticides."

Whether or not such complaints as these are justified, this reporter does not feel competent to judge. They seem general enough among some of the old line distributor firms to indicate that there must be some fire back of all the smoke. A fair share of the fault, we can readily suspect might lie with distributors of the school that has sold products for years without bothering to learn anything about them—and who now feel that it is the job of the sellers of new and improved insecticides and fungicides to spoon the facts on these new products out to them without any effort on their own part. They seem to feel that is part of the manufacturer's responsibility.

Well, maybe it is, and maybe it is a responsibility that will be discharged a little more capably now that sellers once more seem to have become more numerous than orders.

•

Flax Areas Increase 2, 4-D

The Flax Institute, Minneapolis, Minn., has recently issued results of a survey on the use of chemical weed control in five flax-growing states, North Dakota, South Dakota, Minnesota, Iowa and Wisconsin. Total acres sprayed with 2,4-D ranged from 1,577,785 in N. Dakota to 300,000 in Wisconsin. Acres of corn sprayed with 2,4-D ran from a million in Iowa to 5,984 in North Dakota and none in Wisconsin. Acres of small grain and flax sprayed were greatest in Minnesota, with 1,364,742, down to Iowa's 500,000 and Wisconsin's none.

In commenting on the survey, the Institute notes that since each state conducted its own survey in a somewhat different manner, data may not be entirely comparable.

Western Weed Conference Notes Success of

New Herbicides

by

L. W. Kephart

THE Western Feed Control Conference, oldest of the four regional weed control groups, held its 11th annual meeting at Bozeman, Montana, February 2-4. In attendance were some two-hundred and thirty-two persons, about equally divided between representatives of commercial firms and State and Federal agencies. The number was considered gratifying in view of the severe weather which has plagued the western states during the winter. The presence of more than two feet of snow and temperatures as low as 20 degrees below zero failed to cool the enthusiasm and interest in chemical weed control of those who made the trip.

Officers elected at the meeting were as follows: president, E. W. Whitman, Extension Agronomist and Pure Seed Commissioner, Boise, Idaho; vice-president, Dr. W. W. Robbins,, Head, Department of Botany, College of Agriculture, Davis, Calif.; Secretary-treasurer, Walter S. Ball, Chief, Bureau of Rodent and Weed Control and Seed Inspection, Calif. Dept. of Agriculture, Sacramento. Mr. Ball was re-elected to this office to continue his service which began with the organization of the Conference, 11 years ago.

As has been the case for a number of years, interest centered around 2,4-D and methods of using it. The machinery exhibit showed marked improvement in mechanical design and construction of various sprayers.

Although no new and sensational herbicides were announced at the meeting, a number of new substances are being tried, and speakers indicated that before many years, newer and better chemical weed killers specifically adapted to special uses would be available. This was indicated in the titles of a number of papers which were presented at the meeting of the Research Committee on February 2nd. These included a paper by V. F. Brums, U.S.D.A., Prosser, Washington, on control of quackgrass in orchards with ammonium and sodium trichloroacetates. He reported that from 90 to 99 percent control was obtained by heavy applications (218 lbs. per acre active ingredient basis), but because of uncertain regrowth, the process is not yet suitable commercially.

Mr. Brums also presented another report, this time on control of waterweed in irrigation channels with solvent naphthas. He reported that tests on six of the common submerged aquatic weeds showed that concentrations of at least 275 parts per million of the solvent naphthas now commercially available should be used in the northwest.

C. C. Butler, Bureau of Reclamation, Billings, Montana, in commenting on aerial and ground methods of spraying willows with 2,4-D on irrigation systems, said that while the most economic methods of application have not yet been perfected, it is clear that treatment with 2,4-D is by far the most economical method yet devised for treating the thousands of miles of willow that grow along irrigation systems.

"The Effect of Pre-Planting Treatments with 2,4-D upon Alfalfa, Beans, Corn, Oats and Potatoes" was the title of a paper presented by Lambert C. Erickson, University of Idaho. With moisture in the soil, he reported, 2,4-D broke down in 45 days and permitted plantings of various crops. In the absence of moisture, however, the breakdown might not occur regardless of the soil temperature or the elapsed time.

Two papers were presented by V. H. Freed at this session. The first made a comparison of toxicity of some unsubstituted aryl carbamic alkyl esters. He reported that isopropyl N phenyl carbamate (IPC) is by far the most toxic, followed by ethyl phenyl carbamate and meta-chloro derivatives.

His second paper presented a statement on IPC for control of quackgrass. Reductions of stand as high as 85 percent were obtained where application of IPC was made to the quackgrass which was 8 to 12 inches high, provided that the spray was made with oil and amounted to about 120 gallons per acre.

H. E. Bierman, Oregon

Agricultural Experiment Station, Corvallis, presented two papers. His first, "The Comparative Longevity of Sterilization of Trichloroacetic Acid in Greenhouse Trials" reported that sterility of the soil was obtained for a period of about four months when at least 320 pounds per acre of the ammonium salt of this acid was used. The Calcium salt was less effective and the sodium salt least toxic. Mr. Bierman's second paper discussed control of weeds in alfalfa by use of differential contact sprays. He reported that dinitro-phenol at a quart and a half, plus diesel oil at 30 gallons, and IPC at 3 pounds per acre, was the most effective mixture for controlling annual grasses and China lettuce when applied to dormant alfalfa.

"Correlation of Physical Constants of Alkyl Esters and N-phenyl Carbamic Acids with their Phyto-toxicity" was the title of another paper presented by Mr. Freed. In one of the few attempts that have been made to correlate the physical characteristics with the biological activity of a herbicide, he reported, it was found that a high degree of correlation existed between phytotoxicity and a factor calculated from the molecular refractivity of the compound.

Other papers presented on the program included:

"Comparison of the Toxicity of 2,4-D and 2,4,5-T to Ribes," by H. R. Offord and V. D. Moss, U.S. Department of Agriculture, Berkeley, California. From 440 plots in seven western states it was determined that 2,4,5-T was significantly better than 2,4-D as a general purpose herbicide on the various species of ribes (gooseberries and currants) which carry white pine blister rust. A mixture of the two chemicals was satisfactory provided the percentage of 2,4,5-T in the mixture did not drop below 50.

"Tests of the Helicopter over Mountain Terrain for Spraying Woody Perennials (Ribes) with 2,4-D, also by H. R. Offord, showed that 16 ounces or more of 2,4-D acid per acre applied in oil at rates up to 30 gallons per acre from a helicopter proved an effective method of controlling this brush, especially where conformation of the land permitted spraying from two opposing directions.

"The Effect of 2,4-D on the Respiration of Morning Glory Roots," by L. W. Rasmussen, State College of Washington, Pullman, Washington, stated that 2,4-D applied to morning glory foliage in September increased the respiration rate in the roots two to five times with a resultant decrease in root weight of 30 to 40% by the middle of November.

"Control of Annual Weeds in Sweet Corn by Pre-emergence Treatment with 2,4-D," by F. L. Timmons, U.S. Department of Agriculture, Logan, Utah, indicated that 2,4-D as the sodium salt and as an ester was applied at rates of 1, 2, and 4 pounds of acid per acre one day after planting and 5 days after planting. No treatment reduced the stand of corn and the yield of ears was reduced only slightly from the yield of regularly cultivated plots. The heaviest rates gave nearly 100% control of broad-leaved weeds and a satisfactory control of weedy grasses. The light dosages gave less complete but in most cases satisfactory control of broad-leaved annuals.

"Effect of 2,4-D on Weed Control, Yield and Quality in Dry Land Winter Wheat," by D. C. Tingey, Utah Agric. Experiment Station, Logan, Utah, indicated that applications of from ⅛ to 3 pounds per acre controlled Romeria poppy (*Romeria refracta*) but did not successfully control biscuitroot (*Lomatium teptocarpus*). The treatment did not materially affect the acre yield, the weight per bushel, or the protein content of the wheat.

In a series of papers and panel discussions at the open meetings of the conference, February 3 and 4, the developments indicated by the Research Committee seemed to be generally confirmed. Additional and more intensive research appeared to be the universal need as well as a broader educational program to acquaint farmers, chemical manufacturers and dealers with the latest findings in the research field.

Prospects for additional research appeared to be bright with the report of the regional committee for the cooperative regional weed control project under the Research and Marketing Act. Chances now appear to be good that Federal funds will be made available within the next two years for enlarged weed control research by the state experiment stations.

At the business meeting of the conference it was voted to change the name of the organization to Western Weed Conference. It was voted also to broaden membership to include more local people engaged in weed work but to restrict active membership, i. e. voting membership, to representatives of state and county agencies. Under the new arrangement, commercial agencies and Federal representatives will be associate members of the conference.

After considerable argument the Conference declined to issue a policy statement or recommendations as to the uses of herbicides. It seemed to be generally agreed that this was a function of the state agricultural experiment stations. To satisfy the needs of those who find it difficult to summarize the technical results reported at the conference, a special committee was appointed to prepare a statement covering the highlights or most significant points brought out at the conference. The committee had not yet reported at the time of going to press.

Next meeting of the conference will be held in Denver, Colorado, February 1, 2, and 3, 1950.

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Shade Tree Conference Covers CHEMICAL PEST CONTROL

THE fourth annual meeting of the Midwestern Shade Tree Conference was held in Chicago, February 17 and 18. A registration of more than 300 was counted; an increase of nearly 50 percent over the previous meeting. Noel B. Wysong, chief forester, Cook County (Chicago) Forest Preserve District, was elected president; Richard K. Alman, city arborist, Cedar Rapids, Ia., vice-president; and Alfred F. Carlstrom, general foreman of plantations, Chicago Park District, was re-elected as secretary-treasurer.

Papers presented during the two-day meeting ranged from discussions of weed control with herbicides to use of chemicals for eradicating stumps, as well as problems of insect control and plant nutrition.

Reporting on use of 2,4-D for killing Canada thistles, J. H. Simler, assistant chief forester, Cook County Forest Preserves, Chicago, said two applications per year eradicated about 70 percent of the weeds, while three applications in important areas killed 95 to 100 percent. Results from the extra sprayings, he declared, justified the extra cost. Best results followed from application in the early bud stage. If applied at the seedling stage, tops would be killed, but there would be early regrowth and next spring growth would again be abundant. Sodium salts or esters of 2,4-D are equally good, but esters, he advised, should be applied only in open meadow areas, where their volatile nature would not damage other foliage.

Sumac and wild cherry are easily controlled, but while the herbicide kills dwarf willow tops, re-growth from the roots requires re-spraying next year. In killing unwanted tree growths, best results are obtained with those under four feet high and anything larger should be cut down, he said. Stumps should then be treated with ammonium sulfamate or the ester of 2,4-D to retard sprouting.

Use of ammonium sulfamate, he reported, has limitations as a foliage spray and some harm occurred to operators' skin. This material, used at 1 pound to a gallon of water, effectively killed poison ivy in the forest preserves. Re-growth was not as heavy as with 2,4-D and, since ammonium sulfamate dissipates rapidly in the soil, it did not cause soil sterilization. When tried on weeds and grass in park areas and along highways it failed to kill roots and regrowth quickly occurred.

Chemicals for eradicating stumps by burning were rated as useless by Prof. C. S. Walters, of the dept. of forestry, Illinois Agricultural Experiment Station, Urbana. He described tests with eight chemicals and a proprietary stump removal preparation on 64 stumps, followed by burning by various means, including use of a military incendiary called "Goop." The greatest depth to which fire burned in any stump, he said, was about six inches, while most of the stumps were charged only to a depth of less than one inch. The chemicals used, including the commercial stump remover, he summed up, "failed to make possible the burning of hardwood stumps when used as described."

Hormones for control of growth and development of plants were discussed by Eugene Olshansky, president of Science Products Co., Chicago. He listed the five commercial applications in common use, as (1) rooting of cuttings; (2) preventing pre-harvest dropping of apples; (3) prolonging dormancy; (4) selective weed killing; and (5) setting of fruit on crops, and discussed the economic advantages of these various uses. Many applications of hormones remain to be explored, Mr. Olshansky declared.

Dr. L. M. Turk, professor of soil science at Michigan State College, East Lansing, Mich., in his paper on "Soils and the Relations of Soil Organisms to Fertility," challenged the belief held by many persons that the use of fertilizers and lime are harmful to the human body. He criticized, however, the use of fertilizers advertised as "containing bacteria" which would give "good plant growth." It is unlikely, he said, that this growth is due to the organism, adding that "Except for legume bacteria, there is no reason to expect benefits from the addition of bacteria to fertilizer. Soils usually contain all desirable bacteria and the problem is to control them properly, not to add others."

As to the cumulative effect of DDT and hormones on soil micro-organisms, Dr. Turk said, much work has been done, tending to indicate that no permanent damage is done to the microflora.

Insecticides Discussed

PARATHION has been used with good results against scale on juniper and arbor vitae, Dr. L. C. Chadwick, of the dept. of horticulture, Ohio State University, Columbus, told the conference. Some tests of parathion were made on other evergreen pests with good results, but thorough application was necessary, he stated. He presented a detailed outline of recommended chemicals for control of the ten most common pests of evergreens.

(*Turn to page 79*)

for corn borer RYANIA

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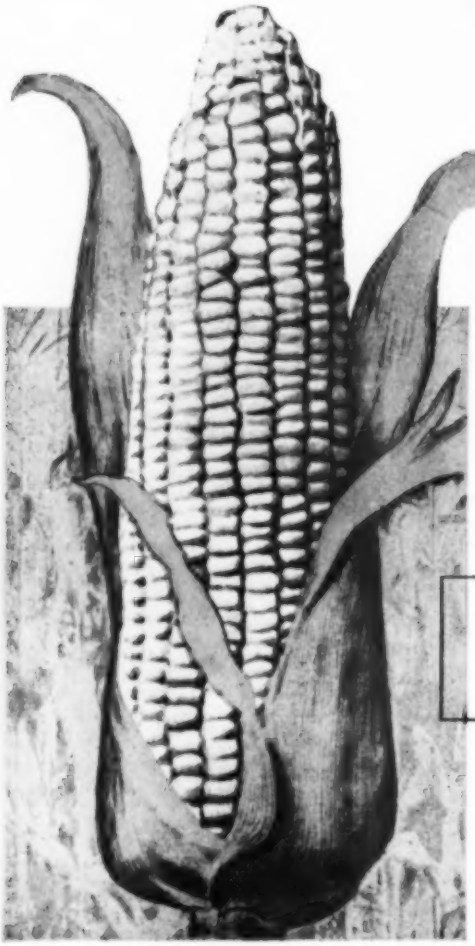

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Off The Record...

HOW can more practical benefit be made to result from the various regional meetings of the A.A.E.E., the Texas Ent. Society, the meetings of the Phytopath groups, etc.? A number of practical suggestions were advanced at the recent Waco gathering to help extension workers, custom sprayers and others get more direct benefit from these meetings. It was requested particularly that those reading papers indicate which of their findings might accurately be described as preliminary, in the nature of interim reports, and what results are final, and perhaps to become the basis for field recommendations.

* * *

The method followed by the North Central Weed Control Conference of issuing a report of the Policy Committee following each conference has much to recommend it. It is appreciated that research workers and government officials alike both have a hesitancy to "stick their necks out." The quasi-official status of a "Policy Committee" report might offer a satisfactory solution.

* * *

The suggestion might also receive serious consideration that details of the experimental work be omitted in the paper reading, confining the reports to brief five to ten minute summaries of results. Added time would then be available for questions and floor discussion.

* * *

A report reached us that consideration is being given to a merger of the A.A.E.E. and the Entomological Society of America. The same report indicates that at the moment at least, there seems little likelihood of such a union.

The Hoover suggestions on governmental reorganization include some recommendations on the operation of the Department of Agriculture. A recent news account reports that in one area, at least, a farmer was found to be getting five different sets of recommendations on his fertilizer program, from five different government agencies, none, incidentally, agreeing with any other set of suggestions. While such situations inevitably must result in any governmental set-up, we have an idea the U.S.D.A., as now operating, is one of the more efficient branches of the government service. Commenting on the proposed program for reorganization, a prominent official of the U.S.D.A. observed recently that he had seen such plans come and go—never with any real gain to the taxpayers, and always with a loss to the operating efficiency of the department, until the situation had shaken itself down once more—often after a lapse of several years.

* * *

Although the U.S.D.A. has predicted a year of heavy grasshopper infestation in various parts of the country, some people are wondering if perhaps the unusually severe western winter might not deter the infestation. Others, in informal discussions, state that the heavy snow may act as an insulating medium, thus protecting the eggs from the extremely low temperatures. At any rate, it seems wise to prepare for an infestation, since any other course may be hazardous and costly.

* * *

The manner in which 2,4-D has apparently "taken over" the weed-killer scene is illustrated in the recent Flax Institute report which states that in North Dakota only 16,656 acres were sprayed with dinitros as compared to 1,577,785 with 2,4-D in 1948. Somewhat the same is true in the report from Minnesota, where the score was 43,015 to 1,500,000, respectively. It will be most interesting to watch the use of herbicides in subsequent seasons. Our guess is that as time goes on, each herbicide, new and old, will find its proper level and will have its specific job to do.

* * *

The California Weed Control Conference, held recently at Sacramento was planned in what seems to be a very logical manner, according to our report from Walter S. Ball, California Department of Agriculture. The two-day session devoted a half day to each of four main topics, so that those attending could concentrate their attention upon one subject at a time, and would not have to choose between attending one of two or three sessions going on concurrently.

* * *

Four topics discussed covered research, regulation, extension, and education, machinery and equipment; which just about takes care of the chief concerns of weed control. Mr. Ball reports that the crowd of some 600 persons stayed until the very close of the session.

* * *

Another advantageous arrangement at the California Conference was one which might be difficult to manage in many places, but which is certainly desirable when possible to achieve. That is having the display of equipment and machinery under the same roof with the main convention. The advantage accrues to both the exhibitor and the person attending the meeting. Sad indeed are representatives of companies which produce chemicals, machinery and accessories when after weeks of planning and work, an attractive exhibit is visited by just a handful of conventioneers. Could we be referring to Baton Rouge?

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A solution containing 30% Geigy DDT (by weight) for dilution with liquids, to control flies, mosquitoes, gnats, bedbugs, cockroaches and fleas.

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Benzene hexachloride formulations containing 25% and 6% gamma isomer.

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For use in the preparation of dusts and sprays for a diversified list of insects on fruits and vegetables.

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A finely-ground powder containing 50% Geigy DDT. For general agricultural use after addition of diluents to formulate DDT dusts.

GEIGY PURIFIED DDT

A dust base containing 40% chlorinated camphene primarily for use in preparing dusts for cotton-pest control.

METHOXYCHLOR 50%

For use in the preparation of special DDT dusts or sprays for use on tomatoes and cucurbits.

GY-COP "53"
(INSOLUBLE COPPER)

For use in the preparation of either sprays or dusts for agriculture, including sprays for the control of flies on livestock and in buildings.

A chemically stable insoluble basic copper sulphate containing 53% metallic copper for use in preparing sprays or dusts.

You can specify any of these dependable Geigy products with full confidence that they will do their part in justifying the claims you make for your insecticides and fungicides. Your inquiries are invited.

*Reg. U. S. Pat. Off. Insecticidal Compositions containing DDT are covered by Reissue Patent No. 22,922

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ORIGINATORS OF DDT INSECTICIDES

Possible Label Changes . . . .
New Recommendations May Affect Future

PESTICIDE SALES

by

Melvin Goldberg
Pesticide Advisory Service
37 Wall Street, New York

RECENT uncertainty concerning the use of materials containing DDT in dairy barns and on dairy cattle has certainly not helped the manufacturer of technical DDT to determine the quantity of material likely to be used during the coming season. Whether there will be a shift away from DDT for this use, with a corresponding effect on other uses, or whether the whole problem can be solved by certain changes in label directions for the use of DDT was not known at press time. However, many manufacturers of finished insecticides are considering the possible use of chlordane, pyrethrum and methoxychlor in combination with or without DDT. In addition to the uncertainty of toxicity, there is also question about the resistance of flies which was reported during the past season when DDT was used alone.

The price and supply of technical DDT appears to be about the same with Government purchases dominating the movement of technical DDT again. The Army Quartermaster Corps recently purchased well over 200,000 lbs. of material for spring delivery while a foreign relief organization advertised for a like quantity of material for prompt delivery. The price of compositions on the dust and wettable powder is in the 25¢ to 26¢ price ranged in carload quantities.

Rotenone

THERE is a definite firming up in the rotenone market, indications of which were given by the announcement of one of the leading processors of a 30¢ price for carload quantities. This represents an increase of 2¢ lb. based on 5% rotenone material.

It is still apparent that there will be a definite shortage this spring and the shortage will no doubt be intensified by whatever shifting there may be from the synthetic organics over to the botanicals. New root is still being offered in the South American market at 19¢ to 20¢ lb.

Pyrethrum

SUPPLIES of pyrethrum continue to be tight and the price firm. There are indications from the importers of the material that they have but little material to offer for shipment within the period July, 1949 to the end of the year. This would indicate that the price will undoubtedly remain at its present level or may rise.

The use of synergists and extenders is of more importance now that there is some possibility of including this type of product in conjunction with DDT or as a substitute for DDT in dairy fly control.

Benzene Hexachloride

THE price outlook for benzene hexachloride has weakened somewhat, with the technical material being offered in the price range of 2-2¼¢ per gamma unit for season's requirements. The 3-5-40 mixtures appear to be in the same price position as they were at the end of the consuming season last year, namely, 15-16¢ per lb. to the dealer in carload quantities.

Parathion

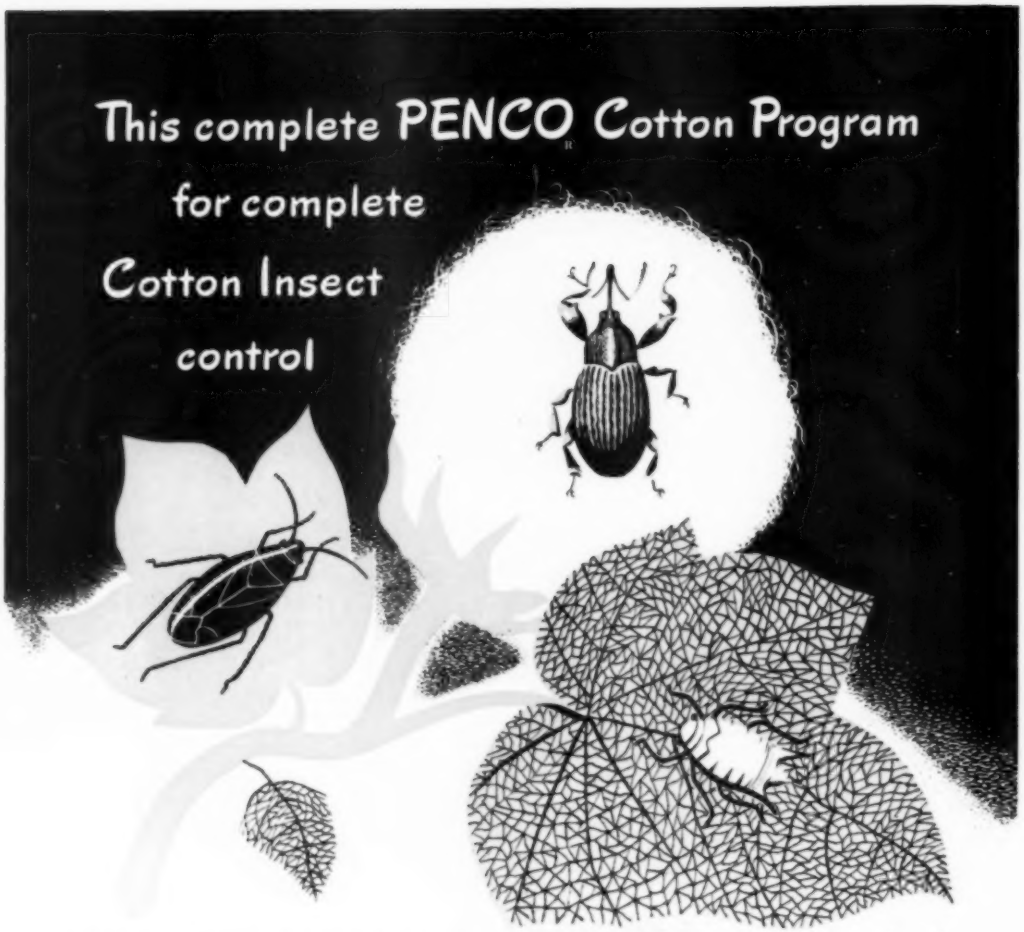
LEADING producers of this material continue to report a brisk demand. The price has remained quite firm and some factors in the industry are experiencing definite difficulty in obtaining their needs for prompt shipment. Much interest has been expressed in bringing in new producers but as of this writing there is still only one large producer and two smaller producers who are responsible for most of the shipments to date.

Copper

MOVEMENT of copper fungicides has improved and many industry spokesmen are optimistic regarding the outlook for the coming season. Although the organic fungicides are making definite progress, many industry spokesmen believe that both copper sulphate and basic copper sulphate still have their place in the fungicidal picture. They point out that it is difficult to switch the use completely from the coppers to the new organics and feel it

(Turn to page 89)

This complete PENCO® Cotton Program for complete Cotton Insect control



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The complete Penco Cotton Program offers a line of insecticides effective against the major cotton insects.

With this Program, you can help cotton planters to better pest control . . . and help yourself to bigger insecticide profits. These Penco Insecticides are the result of the research ability and manufacturing skill of Pennsalt . . . *a basic* producer of fine chemicals for 99 years. And they're field tested to assure effective results in actual use.

PENCO CALCIUM ARSENATE—*Produced in the South for use in the South* to control boll weevil, bollworm and leafworm. Use as is or in mixed dusts with sulfur.

PENCO BHC DUST BASE D-12—Contains 12% gamma isomer of benzene hexachloride . . . used in preparing finished BHC dusts for control of boll weevil, cotton aphids, flea hoppers. A micron-sized high gamma concentrate ready for simple blending. Can be combined with Penco DB-50 and sulfur for formulation of combination dusts such as BHC-DDT-Sulfur 3-5-40.

PENCO BHC TECHNICAL—36% and 18% gamma isomer products for insecticide manufacturers with equipment capable of handling technical materials.

PENCO DB-50 (Dust Base)—Contains 50% DDT for use by compounders in preparing finished DDT dusts for use on cotton.

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The Listening Post

Looking Back on the 1948 Insect Situation

This column, reviewing current insect control programs, is a regular feature of AGRICULTURAL CHEMICALS. Mr. Haeussler is in charge of Insect Pest Survey and Information, Agric. Research Adm., B. E. & P. Q., U.S.D.A. His observations are based on latest reports from collaborators in the department's country-wide pest surveys.

By G. J. Haeussler

THIS season of the year, when insect activity is still at a low ebb in most parts of the country, is always a good time to look back and see what type of damage was done by some of our more important pests last year. The status during 1948 of two corn pests, the European corn borer and the southwestern corn borer, was discussed in this column last month.

Reviewing further, we find that a general outbreak of the fall armyworm occurred in 1948 from Virginia south to Florida and west to Mississippi. Corn, peanuts, grain sorghum, soybeans, alfalfa, pastures, and the grasses of lawns and golf courses were damaged. This insect injured late-planted corn, summer-planted sugarcane, and rice in Louisiana. It also injured rice in Texas, and was very abundant in the Lower Rio Grande Valley where corn, grain sorghums, broom corn, and some vegetable crops were severely damaged.

Velvetbean caterpillar infestations were generally light last year from South Carolina to northern Florida and west to Mississippi and Louisiana. Some dusting wtih insecticides was required to control this pest in southern Georgia and in Alabama.

The 1948 harvest-time infestation of the sugarcane borer was the lowest since 1940 in Louisiana. A harvest-time survey in Florida indicated that the 1948 infestation in that state was not much, if any, higher than average.

Stored-grain pests caused more damage last year than usual, according to reports from many sources. A heavier carry-over of grains on the farm, the mild winter of 1947-48, and a higher moisture content of wheat stocks when placed in storage in some sections of the country were apparently contributing factors.

The area over which the Japanese beetle is generally distributed increased about 3,200 square miles last year over the area generally infested in 1947. There were fewer beetles in 1948 than during the previous summer in most parts of the infested area. In some places the reduction was due to a deficiency of summer rainfall in 1947; in many other places it was probably due to increased activity of milky disease organisms, parasitic insects, and other biotic agents. Summer rainfall in 1948 was far below normal in the northern part of the area of general distribution. A reduced beetle population in 1949 is therefore anticipated in most of New England and in parts of New York and Pennsylvania. In most other areas infested by this insect summer rainfall was close to normal last year.

Among the orchard pests, infestations of the oriental fruit moth were unusually severe during 1948 in most of the infested areas in the eastern part of the United States. Infestations of the codling moth were generally very light in most apple-growing areas, due largely to the general use and effectiveness of DDT. There was a general increase last year in codling moth infestation of walnuts throughout the entire walnut-producing area of northern California. The red-banded leaf roller was a serious pest during 1948 in apple orchards of New York, New Jersey, western Maryland, northern Virginia, and northwestern West Virginia. Infestations appeared to be less injurious in the Ohio River Valley, in southern Michigan, and in Missouri and Kansas. Orchard mites were very abundant throughout most of the fruit-growing areas of the eastern and central states. The plum curculio was more abundant and caused more damage than usual throughout most of the northeastern quarter of the country. However, this insect was less abundant and less destructive than in 1947 in the southeastern states.

With regard to some of the truck crop and vegetable insects, infestations of the Mexican bean beetle were generally lighter in 1948 than usual in southeastern sections of the country and in Ohio. The infestation in north-central Tennessee, however, was heavier than in recent years. Infestations of the potato leafhopper on beans were generally light during 1948 in Florida, Georgia, South Carolina, Tennessee, and Ohio. Tomato fruitworm infestations on tomatoes were generally light to moderate in the southeastern part of the country, but this insect caused more damage than usual in Tennessee. Infestations were relatively light on tomatoes in Ohio, Utah, and California.

The serpentine leaf miner was an important pest of winter

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vegetables, particularly tomatoes, potatoes, beans, and peppers, in Florida last year. It also damaged peppers and tomatoes in southern Texas, and occurred in outbreak numbers on cantaloup in the Salt River Valley of Arizona. It caused serious damage to tomatoes in southern California, and also injured squash, pumpkin, lettuce, celery, and cantaloup in some sections of that state.

Populations of the tuber flea beetle were considerably higher last year than in 1947 on potatoes in Colorado, Wyoming, and Nebraska. In the Northwest, larvae of this insect caused more damage to potato tubers in 1948 than in any year since 1944.

The pea aphid infestation in Wisconsin in 1948 was the heaviest and most widespread in that area since 1923. Apparently, weather conditions were largely responsible. An enormous population of this pest developed in the southern part of the Blue Mountain area of eastern Washington and Oregon late in June 1948. Nearly 11,000 out of 62,000 acres of green peas were treated

(*Turn to page* 81)

Downy Mildew of Oats in New Areas

This department, which reviews current plant disease and insect control problems, is a regular monthly feature of AGRICULTURAL CHEMICALS. The comments on current plant disease problems are based on observations submitted by collaborators of the Plant Disease Survey, Bureau of Plant Industry, Soils, and Agricultural Engineering, U. S. Department of Agriculture, Beltsville, Md.

By Paul R. Miller

OATS downy mildew, caused by the fungus *Sclerospora macrospora*, has been found infrequently in widely scattered locations. Almost every time it has been reported it has been from a State in which it has not been observed before.

In Indiana the disease occurred for the first time in nursery plantings of spring oats on the Purdue Soils and Crops Farm at Lafayette, in 1946 and again in 1947, according to a report by R. M. Caldwell and R. R. Mulvey of the Purdue Station and T. R. Stanton of the U. S. Bureau of Plant Industry. It did not occur again in 1948 on this farm, although oats were grown in plots adjacent to those on which the disease was found in 1947.

In 1946 infection was light but rather general over an entire yield-testing range 160 feet wide and 1200 feet long. Infection was somewhat heavier in the lowest parts. Infected stalks were characterized in this year by late maturity, flag, i.e. lower, leaves showing a mottled green color, and exceptional height which caused the green infected heads or panicles to stand out conspicuously above the normally ripened panicles. Infected panicles were much distorted. In spite of the conspicuous infection, losses were insignificant. Oats on other areas of this same farm were not infected.

In 1947 the disease showed up in an entirely different manner. It was rather closely confined to the most poorly drained areas of the oat breeding nursery plant; in these areas infection approached 100 percent. The most severely affected plants were extremely stunted, becoming only 10 to 15 inches high in comparison with 36 to 48 inches for uninfected plants. The majority of such plants did not head; panicles that were produced were characteristically distorted. Yield loss in the central parts of these low areas was almost complete. Infection became markedly less severe at the margins of such low areas, dropping to zero over a distance of 50 to 75 feet.

These are the only two instances in which downy mildew of oats has been recognized in Indiana. Both years were characterized by unusually moist soil conditions. In 1946 the oats were grown on land with better natural drainage than that on which the disease occurred in 1947, which may explain the extremely diverse manifestation of symptoms in the two years. The 1948 season, in which the disease did not occur on low lying soil adjacent to the severe infection of 1947, was relatively dry during the seedling and jointing stages of the oat crop.

T. R. Stanton, H. A. Rodenhiser, and Harland Stevens, of the U. S. Bureau of Plant Industry, report that the disease was also found for the first time in Idaho, on oats grown under irrigation at Aberdeen, in July, 1948. Diseased plants of Overland oats were observed first in a three-acre field, previously in grass as a pasture, on a small farm leased for some years by the U. S. Soil Conservation Service. Infected plants were stunted and their panicles were variously abnormal. Diseased plants were fairly evenly distributed throughout the field except that they were common in the lower portions where excess irrigation water collected. In some of the lower areas more than 10 percent of the plants were infected.

At about the same time, numerous downy mildew-infected plants were found in a rather late-sown oat nursery on the Aberdeen Branch Station of the Idaho Agricultural Experiment Station. Infected plants could be found rather easily and did not seem to occur more frequently in

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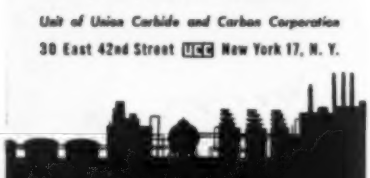

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any particular type or variety of oats. This area was in small grains in 1947.

Other oat fields in the vicinity of Aberdeen were inspected but no downy mildew was found in them.

50-Year Survival of Fungus

BYRON R. HOUSTON and P. F. Knowles of the University of California report an observation demonstrating the difficulty of getting rid of a soil-borne disease-producing organism once it has been introduced. According to them, the cultivation of flax has become increasingly important during the past five years in the coastal area of San Mateo County, California. Because of the coastal climate the crop has been grown largely as a spring and summer crop. The high humidity and rainfall in this region has been conducive to infection by several foliage and stem diseases but *Fusarium* wilt, caused by the soil-borne fungus *Fusarium oxysporum* form *lini*, had not been reported from this area until July 1948, when a severe infestation of the disease on two fields on the same farm was noticed. These two fields had not been under cultivation for more than 40 years, and no flax crop had been grown since 1898, at which time fiber flax was planted. Apparently, the wilt organism was introduced with the fiber flax crop, and has survived through the intervening 50 years.

The possibility that the organism had been introduced on the seed planted in 1948 was ruled out on the basis of its unequal distribution over the field and the size of the infested areas. Plants were killed after about six inches of growth in uniform areas from 10 to 100 square feet. These spots continued to enlarge throughout the growing period.

The ability of the fungus to survive at such a high level of infestation in the absence of flax culture was found to be due to the presence of a "wild" flax growing in this region, around the margins of the affected fields and in adjacent uncultivated areas. This flax appeared to be either *Linum angustifolium*, or an escape from the domestic flax, *L. usitatissium*, planted 50 years ago. Greenhouse tests in wilt-infested soil showed this "wild" flax to be susceptible to attack by the wilt organism. It appears that the organism was maintained by its late season attack on the "wild" flax which normally matures in July. Because the infection occurred relatively late in the normal growing season, the host was able to produce sufficient viable seed to maintain itself over a period of years.

Corral Spot Effect on Beans

R. S. BASKETT, Assistant Farm Advisor in San Joaquin County, California, and C. Emlen Scott, Extension Specialist in Plant Pathology of the Agricultural Extension Service, University of California, state that zinc deficiency has been widely recognized in California since about 1931 in deciduous fruit and nut trees, citrus, grape vines and ornamental trees and shrubs. It has been suspected a few times in annual plants in the San Joaquin Valley but there seems to be no recorded case of response to zinc applications in any annual in California. Soils in which fruit and nut trees will become worthless if not supplied with zinc are usually excellent for a wide variety of annual crop plants, including those known to develop deficiency symptoms elsewhere.

Zinc deficiency symptoms are frequently markedly accentuated in old corral sites within little leaf areas. In other areas this deficiency is often found only on corral sites or Indian camps. Trees in such areas have shown striking response to zinc but in some instances copper is also lacking.

Therefore, a corral spot in a 110-acre field planted to Red Kidney beans near Linden, San Joaquin County was of special interest. A chlorotic area of an acre or two occurred near the center of the field. Two sides of the area were sharply defined, suggesting old fence lines, while the balance of the margin was somewhat irregular. When first examined on August 12, 1948, the affected plants were stunted, the foliage showed interveinal chlorosis, and very few pods had set. The immature leaflets were abnormally narrow, and were crinkled or ruffled. These symptoms agree with the description of zinc deficiency of beans in Florida.

Zinc sulfate plus hydrated lime was applied as a foliage spray to a 1/50-acre plot on August 17. The dosage was at the rate of 2 lbs. zinc sulfate and 1 lb. hydrated lime in 50 gallons to cover one acre, or actually 18.25 grams of zinc sulfate to the plot.

Immature leaves which were tagged in the spray plot on August 17 were normal on August 24. Similar tagged leaves in the unsprayed area showed definite symptoms on this date. On September 9 all but a very few of the new leaves in the spray plot were normal and some of the older leaves had recovered their normal color. Blossoming was in progress and new pods were setting. By that time the unsprayed plants in the corral area were stunted and had set very few pods. On August 12 the corral was conspicuous because of the chlorotic foliage in contrast to the dark green of the normal plants. By September 9 this appearance was reversed as the normal plants were yellowing from maturity and the corral area was comparatively darker in color because of delay in maturity.

This bean field adjoins an orchard district (walnut, peach,

(*Turn to page 79*)

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Suppliers' Bulletins

Hough Issues Catalog

Frank G. Hough Co., Milwaukee, has issued a catalog describing the company's new 4-wheel drive Model "HM Payloader." Among the outstanding features of the 1½ cu. yd. tractor shovel are hydraulic bucket control, variable speeds both forward and backward, quick forward-reverse control, controlled dumping and operator visibility. The company also manufactures other sizes of similar equipment. Copies of the catalog are available from the Frank G. Hough Co., 804K Sunnyside Ave., Libertyville, Ill.

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Issues Weed Booklet

The Manitoba Department of Agriculture and Immigration, Winnipeg, Canada, has issued a recent booklet, "Questions and Answers on 2,4-D," written by H. E. Wood, Chairman, Manitoba Weeds Commission, P. J. Olson, professor of Plant Science, University of Manitoba, and G. L. Shanks, professor of Agricultural Engineering, University of Manitoba.

In question and answer form, the booklet discusses the susceptibility of weeds, covering timing, dosages, and seasonal considerations. The different forms of 2,4-D are described, as is the field use of the herbicide. Machinery for application is discussed, with illustrations of sprayers. The bulletin is designated as publication No. 219, January, 1949.

•

Union Offers Bag Closer

Union Special Machine Co., Chicago, has announced a new bulletin describing its line of equipment for closing filled textile and paper bags. Complete information is given about sewing heads, columns, tables, conveyors and accessories manufactured by the company. A number of photographs illustrate various uses of the equipment. Write for bulletin No. 200, in care of the company, 447 N. Franklin St., Chicago 10, Ill.

•

Custom Operator Folder

Jack Wilson Chemical Co., Stockton, Calif., has recently produced a four page advertising folder describing the company's services in pest control. The front page carries five photographs of air application and ground sprayers while the two inside pages contain copies of testimonial letters from customers. The Wilson Co. applies 2,4-D by helicopter in some cases, by airplane in others, and by ground equipment when such use seems best. The folder points out that the Wilson company has pioneered in the field of weed control and that its position is to utilize the best equipment for the individual job, with full cooperation of the grower.

•

Offers Fungicide Bulletin

Andrew Wilson, Inc., Springfield, N. J., offers a bulletin on its fungicidal product, "Anti-Damp" for control of damping-off disease. The material, said by its makers to possess therapeutic properties, has been tested thoroughly. Write for special bulletin J-492, care of the company.

•

Two Eston Bulletins

Eston Chemicals, Inc., Los Angeles, Calif., has recently issued bulletins describing two soil fumigants, "Brofume" and "Nemafume." The former, for control of wireworms and certain nematodes, contains ethylene dibromide as an active ingredient. The bulletin describes each step in using the material and presents photographs of equipment for such application.

"Nemafume," for control of nematodes, consists principally of 1,3-dichloropropene and 1,2-dichloropropane. The bulletin on this product also presents full information on how to use the material and proper machinery for application.

•

New Riverdale Products

Riverdale Chemical Company, Harvey, Ill., has announced the production of two new products, "Pegesta" and "Dispersant No. 6." The former is an emulsifying agent for use with DDT, chlordane, toxaphene and 2,4-D esters; the latter for use in formulation of amine salt of 2,4-D for the prevention of hard-water precipitates. Testing samples are available by writing Riverdale Chemical Co., 324 E. 147th St., Harvey, Illinois.

•

Colloidal Dust Sticker

Colloidal Products Corp., San Francisco, has published data sheets on the results of 1948 tests in Florida and on the West Coast with their CP-5 Dust Sticker covering both ground and airplane application. The report covers results with various insecticides and fungicides on tree fruit, potatoes, nuts, hops, and other crops. Full data is available from the company at 2000 Taylor St., San Francisco 11, Calif.

•

New Dobbins Sprayer Out

Dobbins Manufacturing Co., Elkhart, Indiana, has announced a new high-pressure sprayer with a pump which can maintain 300 pounds pressure, for spraying small orchards, dairy barns, cattle and gardens. The 50 gallon capacity unit is powered with a 1½ HP gas engine and a double-cylinder pump. Further details are available from the company.

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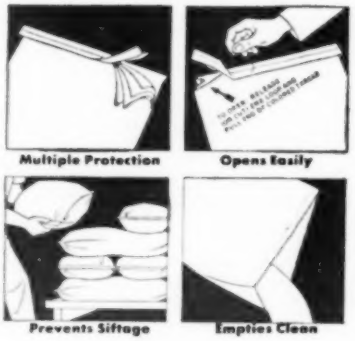

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Technical Briefs

Sprays Check Grape Rot

Spray schedules employing "Fermate" gave effective control of black rot in New York State vineyards this past season, the N. Y. State Experiment Station reports.

Losses from black rot exceeded fifty per cent of the crop in many unsprayed vineyards of Concord and other susceptible varieties in the Hudson Valley. Frequent rains during and immediately after the bloom period provided exceptionally favorable conditions for the disease in that area of the State.

"Experimental tests and observations this past season confirmed results of the past three years which show that the organic fungicide "Fermate" when properly applied gave much more effective control of black rot than bordeaux mixture and without causing injury to the vines," says Dr. A. J. Braun of the Experiment Station at Geneva.

Bordeaux mixture, long the standard grape spray, causes a reduction in vine growth and delays ripening of the fruit. "Fermate," on the other hand, seems to increase vine growth and berry size without affecting the ripening of the grapes.

Dr. Braun points out further that while "Fermate" is superior to bordeaux mixture for controlling black rot, it does not control downy or powdery mildews effectively. On varieties where these diseases are the only ones to be combatted, bordeaux or fixed copper sprays with lime added should be used. For Concord grapes which are frequently attacked by both black rot and powdery mildew, the application of "Fermate" is advised at the rate of 1½ pounds in 100 gallons of water before bloom, immediately after bloom, and seven to ten days later, to be followed two weeks later with an application of bordeaux mixture at the rate of 4 pounds of copper sulfate, 4 pounds of hydrated lime, and 100 gallons of water.

•

Particle Size of Dusts

The protective value of a fungicidal dust depends on particle size as well as on its innate toxicity. A method based on fractional sedimentation is described for isolation of fractions of definite particle size from agricultural dusts. Mathematical procedures are developed by which it is possible to estimate the type and number of sedimentations required, as well as the mean radius, particle size distribution, and amount of each fraction that will be obtained. Isolation of fractions of definitely known distribution aids in evaluation of those biological and physicochemical properties which are modified by changes in particle size. H. P. Burchfield, D. K. Gullstrom, and G. L. McNew, *Anal. Chem. 20*, 1168-73 (1948).

•

Soil Fumigation Studied

During the past 10 years, the cost of fumigating soils for the control of nematodes and wireworms has been brought down to about one-tenth of its former amount. The discovery of inexpensive fumigants that will kill these two pests without the necessity of being sealed in the ground for a period of time opens the way for treatment of large areas which hitherto it was not feasible to treat.

The newer fumigants, containing ethylene dibromide, or a mixture of dichloropropene and dichloropropane are unfortunately not nearly such good fungicides or herbicides as is chloropicrin, or even methyl bromide. The latter two materials have properties which still give them an important place in the control of several important pests in greenhouses and plant-propagating establishments.

Use of these and the other fumigants in greenhouse soils for nematode and wireworm control is explained in some detail and the results of experiments in a vegetable greenhouse are given, which show that with the expenditure of from 0.7 to 3.8 cents per tomato plant for fumigants, an increased yield valued at from 19 to 26 cents per plant was obtained.

The results of field comparisons between DD mixture and one containing 10 per cent ethylene dibromide on five carrot fields over the State indicated that root-knot nematode could be controlled by applications of from 20 to 30 gallons (200 to 300 pounds) applied in continuous rows 10 or 12 inches apart and 6 inches deep, two or more weeks before sowing. When dosage rates were reduced to 20 gallons or spacing was increased to 12 inches, control was sometimes a little less effective. There was some reason to believe higher dosage rates for muckland than for sandy loam would be desirable, in which case early fall applications would be preferable because of the possible flavor that might be imparted to the carrots.

—A. G. Newhall and Bert Lear, Cornell University Agricultural Experiment Station Bulletin No. 850.

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Extra Yields in Oklahoma

Outstanding results with the use of fertilizer on Oklahoma farms has been noted in the biennial report of the Oklahoma Agricultural Experiment Station, Stillwater. Some of these results include corn yields increased 20 to 30 bushels per acre on some

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eastern Oklahoma soils, with some of the deeper soils also showing marked benefit from the application of nitrogen fertilizer materials. Phosphate fertilization of alfalfa on a low-phosphate soil multiplied seed yield more than five times, while spring top dressing with ammonium nitrate has increased wheat yields 3 to 10 bushels per acre on western Oklahoma soils which are low in organic matter. Nitrogen fertilization has increased greatly the seed yield of grasses, in some cases as much as five times.

Non-Toxic Repellent for Horseflies

MANY new insecticides have been tested during the past four years by the Oklahoma Agricultural Experiment Station, for control of tabanids. Although DDT, BHC, chlordane and toxaphene caused mortality for a day or two after spraying, little repellency was shown. Materials containing piperonyl butoxide or piperonyl cyclonene, however, were significantly repellent when used in safe concentrations. These materials were used in four formulations tested on a small herd basis during the 1948 season.

Experiments were made near McAlester, Oklahoma, where an intermittent stream containing numerous permanent pools ran through the pastures where the test cattle grazed. The animals were purebred herefords, so gentle that one could walk among them and count flies without difficulty. During the counting period, the average fly population ranged from 29-7 per animal.

Spraying was done early in the morning of the first day of each test, with the check group remaining unsprayed, but being allowed to associate with the sprayed animals. Herds in the vicinity were also counted at regular intervals and the number of flies on them were compared with those on the check animals to determine if possible the effect of the sprayed animals on the fly populations. Flies on sprayed and check animals were counted as often as possible, but this depended somewhat on the weather and the grouping of the cattle . . . when the animals were scattered widely while grazing, fewer counts were made. When the fly population on the sprayed animals approached 50 percent of that on the checks, the animals were resprayed.

Materials were supplied by U.S. Industrial Chemicals, Inc., as emulsion concentrates. These were diluted at the rate of 1 part of concentrate with 14 parts of water, and each animal received one liter of spray per application.

The tests with the four spray materials were repeated four times during August and once in September. The spray formulation which provided consistently better control was composed of 6.67 grams of piperonyl butoxide and 0.67 grams of pyrethrins per liter of spray. Two formulations each of which contained 5.33 gr. piperonyl butoxide and 0.13 gr. pyrethrins, with one having an added 0.67 gr. of rotenone, gave similar results, indicating that the addition of rotenone contributed but little to the control of tabanids. Piperonyl cyclonene was less effective than piperonyl butoxide in these tests.

Over 80 percent of the flies present in the tests were *Tabanus abactor* Philip and *Tabanus sulcifrons* Macq., although *Tabanus vittiger* Stone and *T. atratus* Fab. were common during the first three weeks of August. Small numbers of *T. mularis* Stone, *T. venustus* O.S., *T. americanus* Drury, *T. gigantcus* Degeer and several *Chrysops* were seen. Results of tests during September were tabulated, but probably had little significance due to the small number of flies present. During this month, the number of flies on the checks averaged less than 3 percent count per animal while during other periods the average count was 16-24 per animal.

A satisfactory control for tabanids is needed in various parts of the country, but to be of real value on range animals, such a material should last at least a week to reduce losses resulting from handling animals. Such a material should be relatively nontoxic and inexpensive, but no material available at the present time meets these requirements. Closest to meeting the need, however, is piperonyl butoxide which is relatively nontoxic and provides fair protection for from 2 to 3 days. It may have a place on dairy cattle or in protecting animals against flies which are spreading anaplasmosis or anthrax, but its cost will reduce its over-all usefulness for all but such special needs.

—DR. WM. HOWELL, *Oklahoma Agricultural Experiment Station.*

•

Plum Curculio Control

In cage tests carried on at Fort Valley, Ga., in 1948, spray applications of parathion at rates of 1 to 2 pounds of 25 per cent wettable powder per 100 gallons of water killed 100 per cent of plum curculio (*Conotrachelus nenuphar* (Hbst.) adults within 3 to 6 days. This material caused some mortality of adults after it had been on the trees 3 weeks, although much of its toxicity had been lost by the end of 2 weeks. A wettable powder prepared from a technical grade of benzene hexachloride seemed more effective than wettable powders or emulsions prepared from benzene hexachloride having a high gamma-isomer content.

In orchard experiments, benzene hexachloride and parathion were effective for the control of the plum curculio when the results were measured by the infestation in peach drops. There

(*Turn to page* 81)

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Fertilizer News

APFC Announces Plans

Plans are well under way for the fourth annual convention of the American Plant Food Council scheduled to be held at the Mt. Washington Hotel, Bretton Woods, N. H., June 19-22, according to Clifton A. Woodrum, A.P.F.C., president. Mr. Woodrum urges that reservation requests be made as soon as possible, since all indications point to a large attendance. All requests for hotel and transportation reservations for non-members should be forwarded without delay to the A.P.F.C. offices, Barr Building, Washington 6, D. C., Mr. Woodrum suggests.

The appointment of two committees has been announced in connection with the June convention. These are as follows:

Hospitality Committee: G. T. Cunningham, Armour Fertilizer Works, Atlanta, Ga., Chairman; J. D. Stewart, Jr., Federal Chemical Corp., Louisville, Ky.; J. A. Woods, Jr., Potash Company of America, Raleigh, N. C.; Malcolm Hunter, Virginia-Carolina Chemical Corp., Richmond, Va. and F. B. Stephenson, Robertson Chemical Corp., Norfolk, Va.

Golf Committee: A. B. Baker, Jr., Bradley & Baker, New York City, Chairman; A. B. Baker, Bradley & Baker, New York City; Charles Burroughs, Jr., F. S. Royster Guano Co., Norfolk, Va.; Deane Gidney, U. S. Potash Company, New York City; W. F. McLane, Lyons Fertilizer Company, Tampa, Fla., and John W. Ground, III, Thurston Chemical Co., Joplin, Mo.

•

Re-Elects Officers for 1949

Southern Fertilizer and Chemical Co., Savannah, Ga., has announced the re-election of A. D. Strobhar as president following the company's annual meeting. Other officers and directors were also re-elected. In addition to president Strobhar, the officers are: W. Dewey Cooke, vice-president and secretary-treasurer; Henry J. Sutcliffe, assistant secretary; Henry F. Inglesby, assistant treasurer; W. W. Harley, sales manager. Directors are Mr. Strobhar, Mr. Cooke, Hugh Stephens, counsel, Fred Cockrell, J. B. Glover and J. W. Middleton.

BULLETIN

Tennessee Valley Authority has written a detailed explanation in answer to charges made by Paul O. Peters for the Small Business Committee of the House of Representatives, report of which was published editorially in AGRICULTURAL CHEMICALS in February. TVA terms the report on its operations as "inaccurate and misleading." It states that instead of a 1947 operating loss of $4,000,000 as reported by Peters, its chemical plant operations resulted "in a net income of $155,664." TVA declares that the cost of fertilizers used by farmers in the test program should not be charged in the loss statement, nor should the cost of fertilizers used by TVA itself, nor the expense of fertilizer and munitions research and development. These items, TVA says, were accounted for acceptably.

To charges of distribution of fertilizer materials exclusively to farmer cooperatives and other favored outlets and that such practice is unfair and discriminatory to the tax-paying private producers of fertilizer, TVA points out that its obligation is not to distributors of fertilizer, but to the farmers. Distribution is made through cooperatives because they are the only ones who have shown both the "willingness and ability to distribute TVA fertilizer under conditions which enable TVA to carry out its statutory responsibilities," the statement declares.

Regarding fertilizers for export, TVA points out that all sales for export have been made to comply with directives of Federal agencies according to authority granted by Congress. Moreover, all such exports have been for use of the U. S. Army or for allied countries.

So far as processes to improve and cheapen fertilizer materials, are concerned, TVA says that although it is true that the Treasury Department did pay TVA $1.01 per unit of P.O., this high price was for one shipment only, to compensate for losses sustained on earlier shipments so that the average price would equal TVA's average production cost. During the war, the cost of making superphosphate was high for TVA because two out of four tons of elemental phosphurus went into munitions, making the resulting small-scale and intermittent fertilizer manufacturing unusually expensive.

. . . This report, coming at press time, was too long to include in full text. Next month's issue will elaborate more upon it.

Soil Scientists to Chicago

Soil scientists from thirteen midwestern agricultural colleges gathered in Chicago Feb. 15 for the second annual meeting of the Mid-West Soil Improvement Committee. Reports were presented by thirty agronomists dealing with new developments in fertilizer research and kindred soil improvement subjects and consideration was given to the matter of setting up standards for fertilizer manufacture. Dr. S. C. Bauer of the Univ. of Illinois was chairman of the conference. Attendance was over 200.

•

A. F. Pringle Dies

A. F. Pringle, 65, president of A. F. Pringle & Co., Charleston, S. C., died suddenly February 5 in his office. He was one of the oldest manufacturers of fertilizer in Charleston. His career began with the Combahee Fertilizer Co., Charleston, and in 1918 he helped organize the Merchants Fertilizer and Phosphate Co., of which he later became president. Mr. Pringle was founder of the company which bore his name, and was also vice president of the East Shore Terminal Company. He was active in agricultural affairs of the state.

•

Calif. Fertilizer Outlook

The California Fertilizer Association *News Letter*, dated January 31, takes a long look at the general supply situation in the west. Written by Dr. Oliver E. Overseth, executive secretary of the Association, the article states that "Nitrogen production . . . is on an increase, and if no further difficulties are encountered in the form of power shortage and strikes, the domestic production should be on a higher level than ever before. Imports of nitrogen

MARCH MORNING IN TOWN

The talk runs on . . . Of better ways of doing things . . . of better strains of livestock . . . better types of corn and grain . . . better kinds of fertilizers.

Many of the best of these fertilizers contain potash—often Sunshine State Potash, a product of New Mexico. For potash is not only a soil nutrient, it is a crop strengthener as well—helping to resist disease and drought. Through its wise use this vital element may be replaced and built up to assure continuing and abundant yields.

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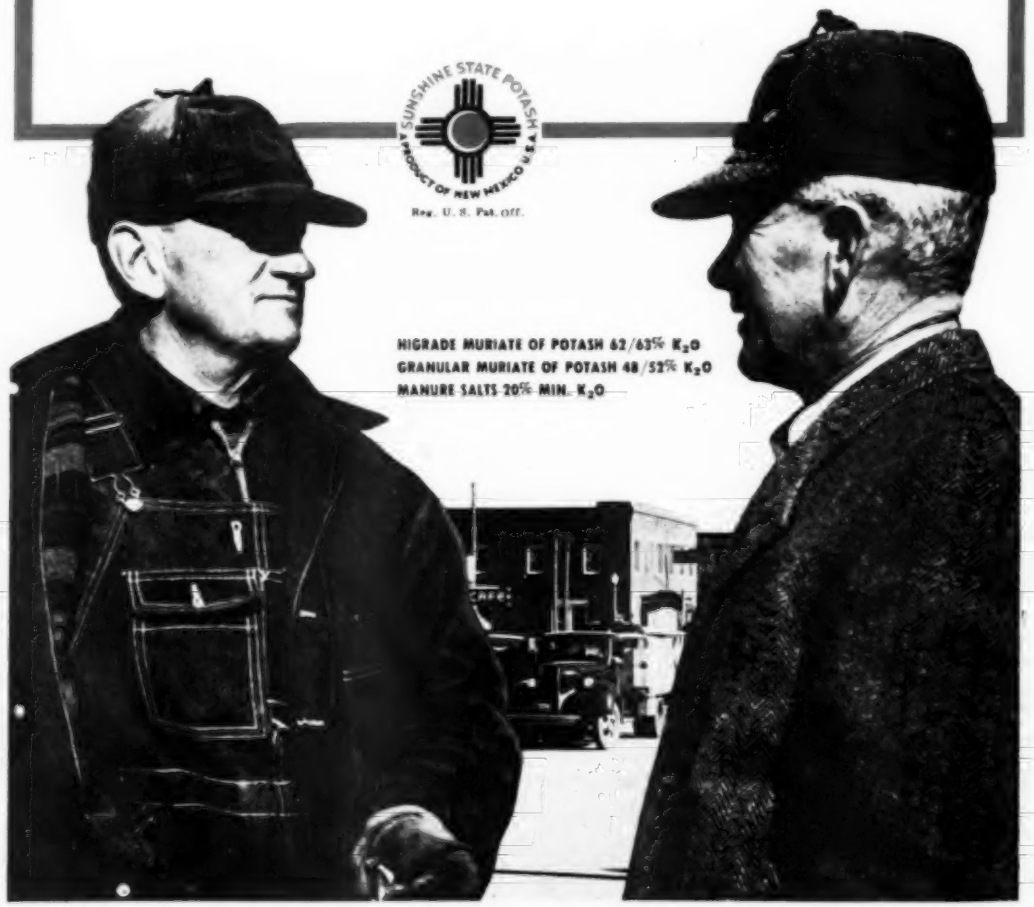

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MANURE SALTS 20% MIN. K_2O

UNITED STATES POTASH COMPANY *Incorporated*, 30 Rockefeller Plaza, New York 20, N. Y.

materials from Canada, Chile and Norway will continue at about the same rate, which should result in supplies catching up with demand at about mid-year. It appears that there will be a continued shortage in concentrated superphosphate and the ammoniated phosphates which will not be relieved during the year. Supplies of ordinary superphosphate and potash will continue strong while nitrogen materials such as ammonium sulfate, nitrate of soda and calcium nitrate will continue to be short in certain areas until imports and domestic production are increased.

"Producers of all materials will attempt to expand production further. . . . It is not felt that export quotas or voluntary exports will affect materially the supplies available for California. . . ."

•

More Fertilizer for India

A fertilizer plant with a capacity of 350,000 tons of ammonium sulfate each year is being built at Sindri, Bihar, India, and is expected to be ready for production by June, 1950. Upon completion, it will be the largest of its type in the East.

A party of Indian chemical engineers took a recent trip to the United Kingdom to study methods of fertilizer manufacture and plant design. Dr. K. L. Ramaswamy, leader of the delegation, said that the Indian government desires to popularize the use of fertilizers to produce greater food crops. India's annual consumption of fertilizers is expected to be about two million tons of organic and inorganic materials.

Six Indian engineers employed by the Government of India recently arrived in the U.S. for a period of training in the operation, maintenance and production phases of fertilizer manufacture. At the end of their training period, the men will return to India to take over the operation of the new fifty-million dollar fertilizer plant at Sindri, some 175 miles northwest of Calcutta.

The plant, engineered by Chemical Construction Corp., New York, is scheduled to be completed late in 1950.

•

1948 Super Production Up

American production of superphosphate during 1948 set a new record, according to National Fertilizer Association compilations. Output of superphosphate totaled 10,555,000 equivalent short tons (18% APA basis), which was an increase of 1.4 percent over the production of 1947. This was due largely to an 18 percent increase in the output of concentrated superphosphate; the other types being produced in quantities substantially equal to those of 1947.

Approximately 88 percent of the 1948 output (9.3 million tons) was in the form of normal superphosphate; and the remaining 12 percent consisted of 469,000 tons of concentrated (45 percent APA basis) superphosphate and 61,500 tons of wet base goods (18 percent APA basis).

However, superphosphate production declined a little in December. Output that month totaled 730,000 tons which was 15 percent below production of the corresponding period of the previous year.

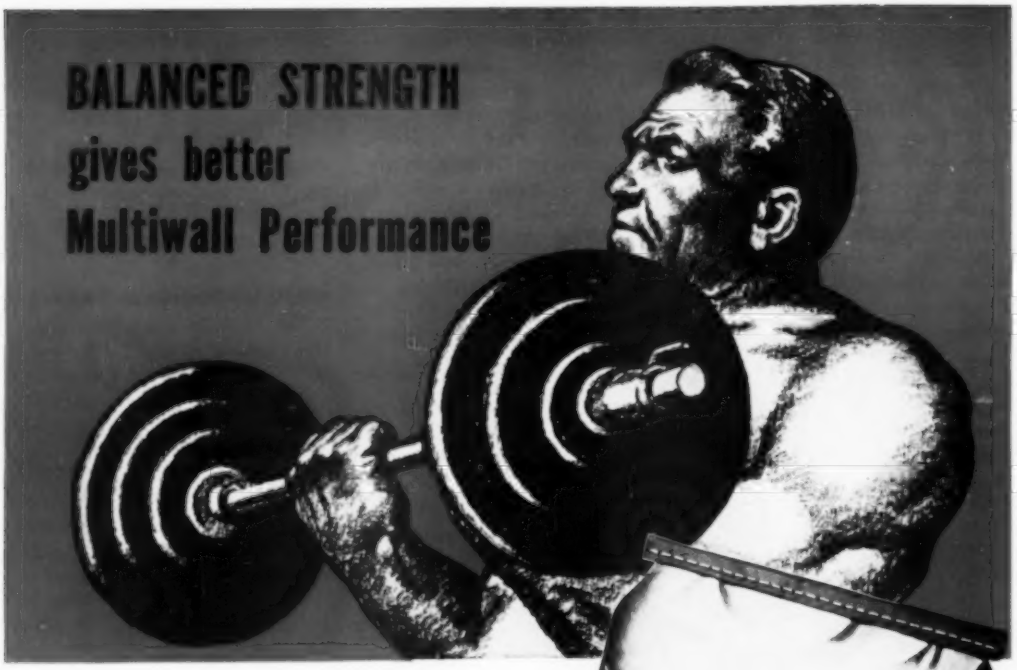
•

APFC Co-Sponsors Contest

The American Plant Food Council, Washington, D.C., is co-sponsor with the National Grange, of a nation-wide essay contest on "Conservation of Our Soil Resources." Prizes will total $15,000. The contest was to begin on March 15 and will continue through June 15, with young men and women through 20 years of age participating. Judges of the contest will be: Secretary of Agriculture Charles F. Brannan, chairman; Dr. Hugh H. Bennett, Chief, Soil Conservation Service, U.S.D.A.; Mrs. Malcolm Byrnes, president, National Home Demonstration Council, Ethel, La.; Dr. W. T. Spanton, chief, Agricultural Education Service, U.S. Office of Education and Dr. M. L. Wilson, Director of Extension Work, U.S. Dept. of Agriculture.

Prizes offered by the A.P.F.C. include a 1949 Buick Sedan and a 1949 Chevrolet as first and second prizes, respectively; and cash awards of $750 and $250 for third and fourth prizes. The Grange offers (in states where the Grange is organized) prizes of $150, $75 and $50. In other States, participants are eligible only for national awards.

Group in attendance to see Washington premiere of new NFA Film, "What's in the Bag," at Mayflower Hotel, February 8. The movie, in sound and color, is available for loan through the Association.



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INDUSTRY NEWS

N.A.C.A. Appoints Weller and Noone

Michael N. Weller

Joseph A. Noone

The National Agricultural Chemicals Association, Washington, D. C. (formerly AIF Association) has announced the appointment of Joseph A. Noone as technical advisor to succeed Dr. Charles L. Smith who has joined Ethyl Corporation. Mr. Noone was formerly connected with the Pennsylvania Salt Manufacturing Co., Philadelphia.

The new NAC Association appointee is a graduate of St. Joseph's College, Philadelphia with an honor degree in chemistry in 1937, and since that time has been with Pennsalt. He began as a chemist at the company's Philadelphia plant, and became, successively, chief chemist of the plant, then supervisor in charge of regulatory and consumer and safety phases of marketing, which position he held until going with the NACA.

The NAC Association has also announced the appointment of Michael N. Weller as editor of the *N.A.C. News*, which is a continuation of the former *AIF News*. Mr. Weller is a graduate of Georgetown University, Washington, D.C., and has held editorial positions with the U.S. Bureau of National Affairs, the *Chicago Journal of Commerce*, Department of Commerce, the Federal Housing Administration, National Emergency Council, and in addition has assisted in the production of numerous Government quarterly, annual and semi-annual publications.

Mr. Weller will handle all publications of the NAC Association, including the *News*, and will be responsible for the release of all press and radio notices reporting the activities of the Association.

MEETINGS

N. Central States Branch, A.A.E.E., Hotel Schroeder, Milwaukee, Wisconsin, March 24-25.

2nd. Annual Texas Weed Conference, Amarillo, Tex., April 21, 1949.

National Agricultural Chemicals Association (AIFA), Annual Spring meeting, Westchester Biltmore Hotel, Rye, N. Y., May 5-6, 1949.

Natl. Assn. of Insecticide & Disinfectant Mfrs., Chicago, June 13-14.

National Fertilizer Association, Greenbrier Hotel, White Sulphur Springs, W. Va., June 13-15.

American Plant Food Council, Hotel Mt. Washington, Bretton Woods, N. H., June 19-22, 1949.

Goodrich Advances Kenney

B. F. Goodrich Chemical Co., Cleveland, has announced the appointment of Robert P. Kenney as manager of chemical sales. Mr. Kenney succeds S. L. Brous who recently resigned to accept a position with General Electric Co. The new appointee was formerly manager of the international sales department. Kenney joined Goodrich in 1944 as manager of international service. In 1945 he became the first manager of the company's international sales department. He is a graduate of Dartmouth U.

•

NACA to Meet May 5 & 6

The National Agricultural Chemicals Association (formerly AIFA), Washington, D.C., will hold its annual spring meeting at the Westchester Biltmore hotel, Rye, New York, May 5 and 6, according to Lea S. Hitchner, executive secretary of the Association. A program of speakers representing industry and Government was being worked out as this issue went to press. Details will be presented in the April issue.

•

N. W. Vegetable Conference

A three-day meeting of the Northwest Vegetable Insect Control Conference was held January 24-26 at the Multnomah Hotel, Portland, Oregon. Representatives at the meeting were principally from the states of Idaho, Oregon, Montana, Utah, Washington, and California, and also the Canadian Province of British Columbia. The group elected as chairman, T. A. Brindley, U.S. D.A., Moscow, Idaho; co-chairman, Robert W. Every, Oregon State College; and secretary-treasurer, David H. Brannon, State College of Washington, Pullman.

NEW STANTOX "64" 2,4-D

(Liquid Amine Salt) now contains a special ingredient to keep it from precipitating in most hard waters

● Last year our Stantox field men in hard water areas experienced one difficulty with Liquid Amine Salt 2,4-D sprays – the 2,4-D had a tendency to precipitate from the solution in the spray tank. So this year you'll find our Stantox "64" 2,4-D contains a hard water inhibitor to keep it from precipitating in the hardest waters . . . a selling point that will come in handy in this year's highly competitive 2,4-D market.

STANTOX "P-44"
(an ester form of 2,4-D)

For those "hard-to-kill," woody perennials and mature weeds.

available under your own private brand or our Stantox 2,4-D label

STANTOX "70"
(Sodium Salt Powder)

To round out the Stantox 2,4-D line, Stantox "70" can be used either as a dust or spray.

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Connecticut Growers Meet

Caution in the use of new chemicals on Connecticut vegetable farms was emphasized by speakers at the February 15 meeting of Connecticut vegetable growers at New Haven. More than 250 growers heard a number of speakers term as "wise procedure" the testing on small plots of many new insecticides, fungacides and herbicides before they are used on large-scale projects. Neely Turner, entomologist and Dr. Saul Rich, plant pathologist, both of the Connecticut Station, and Professor William Lachman of the University of Massachusetts, stressed this point.

•

Dr. Smith Joins Ethyl

Dr. Charles L. Smith, since 1945 Technical Director of the Agricultural Insecticide and Fungicide Association (now National Agricultural Chemicals Association, Washington, D. C.) has announced his new connection with the Ethyl Corporation, New York. Dr. Smith will be in products development work with the company.

Dr. Charles L. Smith

Dr. Smith is a graduate of Rutgers University with the class of 1933, and received his PhD degree from Rutgers in 1937. Subsequently, he has been connected with the International Chemical Manufacturing Co., Jersey City, N. J.; Doggett Pfeil Co., Springfield, N. J.; and then on a resident scholarship at Rutgers, he was connected with Carbide & Carbon Chemicals Corporation before joining the staff of the AIF Association.

During the war, he was active in research for insecticides and repellents.

•

Arey to U. S. Rubber Co.

Phillip S. Arey has been named technical service representative on agricultural chemicals for United States Rubber Company, New York. Mr. Arey will handle field testing of U.S. Rubber's insecticides and fungicides on fruit and vegetable crops in Florida, Georgia and the Carolinas.

Mr. Arey is a graduate of the University of Florida College of Agriculture, and spent the four subsequent years in the U.S. armed forces.

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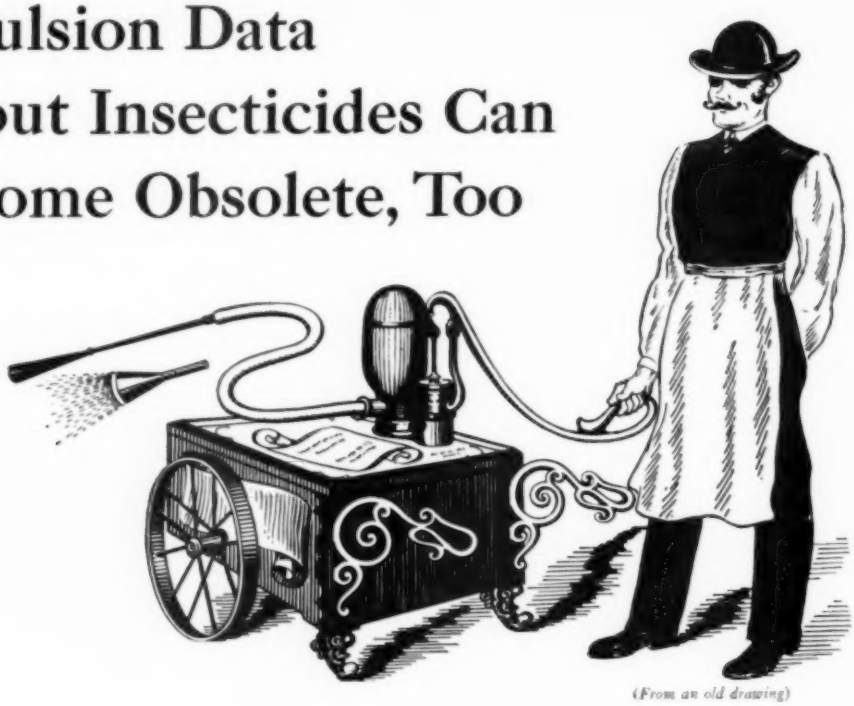
Emulsion Data About Insecticides Can Become Obsolete, Too



(From an old drawing)

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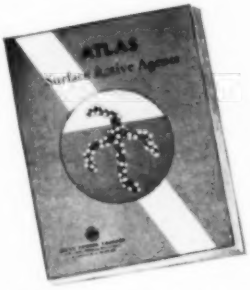
Let Atlas help you bring your insecticide and herbicide emulsion formulations up-to-date. In Chapter 5 of the new Atlas Surface Active Agents book you'll find latest data on the subject, along with many actual formulas.

You'll want to have samples of Atlas emulsifiers, too, for testing when you're planning improvements in your products. Look over the new Atlas book, and let us know which emulsifiers you'd like to try. Liberal samples will be yours for the asking.



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Comments on Sprayers

Stating that the editorial in the January issue of *Agricultural Chemicals* favoring a campaign to put a power spray unit on every farm was "informative and right, but wasn't sufficiently complete," Benjamin Linsky of the Champion Sprayer Co., Detroit, outlined his thoughts as follows:

"What you said there was informative and "right" but it wasn't sufficiently complete, as I will try to show you. A power sprayer is admirable for any farm or garden that is large enough in its use of any one type of spray to justify it.

For the farm or garden that uses less than 25 gallons of any one type of liquid spray at a time, the power sprayer is uneconomical in the following aspects: 1) Too much investment for the resulting usage. 2) Maintenance difficulties on an infrequently-used gasoline engine. 3) Unnecessary cleaning time in tanks larger than necessary. 4) Difficult to maneuver on rough terrain.

A knapsack sprayer can overcome these objections. For less than $30.00, this equipment meets the complete needs of hundreds of thousands of agricultural users."

•

N.P.C.O. Meet in Indiana

The 13th annual Pest Control Operators Conference was held at Purdue University, Lafayette, Indiana, February 7-11. Some 275 persons from 24 states and the Dominion of Canada were registered. Topics covered included new insecticides, rodenticides, and methods of applying them. Speakers included a number of persons prominent in the insecticide field, including Dr. Harold Gunderson, Extension entomologist, Iowa State College, Ames; Dr. Geo. C. Decker, Illinois Natural History Survey, Urbana, Illinois; R. J. Dicke of the University of Wisconsin; Dr. W. E. Dove, U. S. Industrial Chemicals Inc., Baltimore; M. R. Stephens, U. S. Food and Drug Administration, Washington, D. C.; and William O. Buettner, New York, secretary of the Conference.

The group's annual banquet was held on the evening of the 10th, with V. H. Montgomery, San Francisco, president of the N.P.C.O., as toastmaster. In charge of the conference was Dr. J. J. Davis, head of the Purdue University Department of Entomology.

Weddell Gets Appointment

Monsanto Chemical Co., St. Louis, has announced the appointment of David S. Weddell as director of development for the company's western division at Seattle.

Mr. Weddell first joined the firm in November, 1941, as a chemical engineer in the Phosphate Division's Research Department at the company's Anniston, Ala. plant.

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2,4-Dichlorophenoxyacetic Acid
Sodium Salt
Triethanolamine Salt
Methyl, Isopropyl, Butyl Esters
40% Butyl Ester; 44% Isopropyl Ester

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Dichlorodiphenyltrichloroethane
100% technical grade
50% Wettable Dust
25%, 30%, 40% emulsifiable solutions

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444 MADISON AVENUE NEW YORK 22, N. Y. MARCH, 1949

TESTS SHOW ANTAROX A-200 TOPS IN HARD WATER EMULSION APPLICATIONS

The huge quantities of 2,4-D esters used for weed control work in every part of the country call for economical, easy-to-use emulsifying agents. Antarox A-200 answers this call. It is especially valuable in hard water areas because this non-ionic emulsifier is practically unaffected by water hardness in most applications. More detailed information on Antarox A-200 emulsifier in insecticide and herbicide emulsions may be obtained by writing Dept. 25, Antara Products, 444 Madison Avenue, New York 22, N. Y.

Antarox A-200, a liquid, non-ionic member of the aromatic polyglycol ether family has long been known to be an excellent emulsifying agent for insecticides and herbicides. Tests just completed at the Central Research Laboratory of General Aniline & Film Corporation, demonstrated that Antarox A-200 emulsifier is particularly outstanding with Chlordane, Toxaphene, and 2,4-D Esters in hard water.

According to Dr. Herbert L. Sanders, Manager of the Technical Service Laboratory, a number of well-known emulsifiers were compared with Antarox A-200 emulsifier in waters of hardness ranging from 100 ppm to 450 ppm. Stability of the emulsions was checked after 15 minutes, 1 hour, 16 hours and 48 hours. In all cases, he points out, Antarox A-200 gave excellent results and, unlike most other products, was practically unaffected by hard water.

Among the advantages cited for Antarox A-200 emulsifier in connection with Chlordane, Toxaphene and 2,4-D were: no oil separation on storage, better wetting and spreading action, and emulsions that were practically as good in hard water as they were in soft.

Antarox A-200 emulsifier, says Dr. Sanders, is easier to use than most emulsifiers, mixes with water rapidly, gives stable emulsions, and is economical to use. For instance, three parts Chlordane and one part of Antarox A-200 emulsifier give low viscosity concentrates that can be stirred into water with less effort than required when using other emulsifiers.

Callans Discusses Detergents On Soap and Glycerine Panel

Lee D. Callans, Assistant Sales Manager of Antara Products was the keynote speaker on the Synthetic Detergent Panel of the 22nd Annual Convention of the American Soap & Glycerine Producers Association at the Hotel Commodore, Jan. 27.

Mr. Callans discussed synthetic detergents—anionic, cationic, and non-ionic—describing their types and general character, their place from a quality and comparative cost standpoint, and their advantages and limitations.

The anionic type, he pointed out, is recognized to hold the major share of the present market. Its position in the field is believed due to its physical form, its high-foaming characteristics and cost. On the basis of present knowledge, however, the non-ionics—on a performance basis—are proving to be as inexpensive, and, in some cases, less expensive than the anionic detergents. He explained specific applications of each detergent type, among them clothes-washing in conventional and automatic machines, hand and machine dishwashing, shampoos and hand soaps. For years, he said, detergents have not been considered feasible additives for soap because mixtures of detergents and soaps lack foaming characteristics. Non-ionics now offer the promise of special properties without adverse effect on foam.

New markets discussed included the growing field offered by automatic clothes-washing machines and the commercial and home dishwashing field, and the use of cationics as the sanitizers of the future.

Detergents, concluded Mr. Callans, must be suitably built for each intended purpose. When detergents are suitably built, their performance is excellent and their use economical.

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Calif. Weed Conference

The California State Weed Control conference was held at Governor's Hall, State Fair Grounds, Sacramento, on February 16 and 17. The two day conference was divided into four parts, each occupying a half day's discussion, to cover research, regulation, extension and education, and machinery and equipment. In the latter, the large hall was able to accomodate not only the 600 persons attending, but also the equipment which was being discussed. Some of the extra large machines were exhibited outside of the building, however.

The research phase of the program was organized by Dr. A. S. Crafts who acted as chairman of the morning session. He discussed the chemistry of weed control, covering both the chemical products involved, and the physiology of the plant's reaction to these materials.

W. A. Harvey, Monsanto Chemical Co., St. Louis, spoke on 2,4-D as a weed killer, and R. N. Raynor, Dow Chemical Co., Pittsburg, Calif., spoke of new developments in herbicides. Both talks were of non-technical nature, presenting the topics in lay language.

Regulation was discussed during the afternoon of the first day of the meeting, with W. C. Jacobson, Chief of the Bureau of Plant Industry, California Department of Agriculture, leading off with a talk on the general subject of regulation in the pest control field. Frank Parsons, Agronomy Division, University of California, presented a paper on grain cleaning and the control of weeds, bringing out a number of regulations which are intended to help both the grain growers and distributors to get certain assistance from the law.

Milo Schrock, Agricultural Commissioner of Stanislaus County, presented a paper on regulating pest control operators, pointing out the need for such regulation and the benefits to be derived by both the pest control operators and the growers involved.

Allen B. Lemmon, Chief of the California Bureau of Chemistry, Sacramento, spoke on the registration and labeling of herbicides, explaining the need for rules to govern such to the benefit of all concerned.

•

Mosquito Associations Meet

The American Mosquito Control Association, Inc. and the California Mosquito Control Association held a joint annual meeting at the Claremont Hotel, Oakland, Calif., February 6-10. On the program the first day was T. G. Raley, president, California Mosquito Control Ass'n.; Claude B. Hutchison, dean, University of California College of Agriculture; E. O. Essig, Head, Division of Entomology and Parasitology, University of California; and various public health officials and sanitarians.

A symposium on the uses and limitations of new insecticides was in charge of Dr. F. C. Bishopp.

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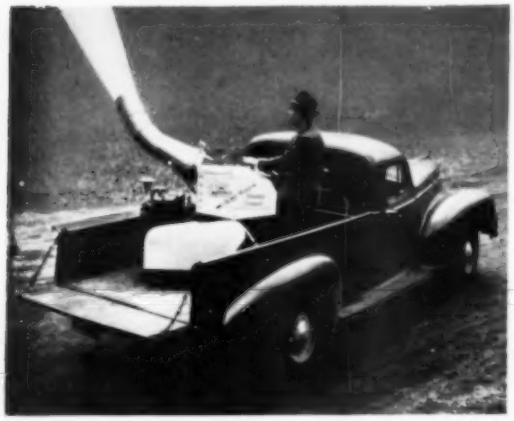

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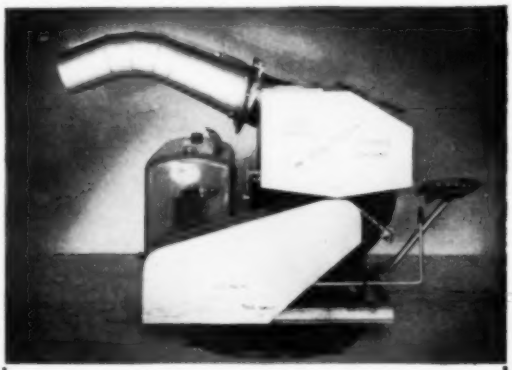

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Synthetic Pyrethrum?

U.S.D.A. studies on the synthesis of pyrethrin-like esters have been successful, the Bur. of Entomology and Plant Quarantine states. In addition to previous findings that pyrethrum contained two active principles, investigators found the existence of two other active principles, designated as cinerin I and cinerin II. Following the determination of the pyrethrins and the cinerins, the synthesis of these was begun. The synthesis of the stereoisomer of the alcoholic component, cinerolone, was successful; and when esterified with chrysanthemum monocarboxylic acid, this stereoisomer of cinerolone furnished an isomer of cinerin I which was as insecticidal as the natural ester to houseflies and other insects.

Detailed descriptions of all syntheses will be published later. Technically qualified persons may gain further information from Dr. R. C. Roark, Division of Insecticide Investigations, Bureau of Entomology and Plant Quarantine, USDA, Beltsville, Md.

LISTENING POST

(*Continued from page 57*)

cherry, pear) where little leaf is not known to be a problem. Coral spots may exist in this orchard area but none have come to our attention. The owner supplied the land history as follows: 1850, barn and corrals constructed; 1900, barn and corrals removed; 1900-1940, cropped to hay, grain, pasture; 1940, land leveled for irrigation; 1941-42-43, beans; 1944-45, tomatoes; 1946, grain; 1947-48, beans.

GUEST EDITORIAL

(*Continued from page 23*)

they are being replaced. Estimates indicate that only about one-sixth of the lost calcium, phosphorus, potassium and nitrogen is being replaced in our soil annually.

A careful appraisal of this problem shows that a permanent and complete solution will require the ingenuity of our best leaders in government working with industry and the American farmer.

How does the fertilizer industry plan to meet its greater role in this ever-increasing problem of agricultural production and soil fertility maintenance? Additional production facilities either are being constructed or are in the blueprint stage to meet the demands of the American farm. New plants are taking advantage of improved techniques for more efficient production and, wherever possible, these benefits will be passed on to the fertilizer consumer. The fertilizer industry is enlarging its own research facilities and encouraging other research agencies to develop new and improved fertilizer materials and mixtures. Industry's agricultural educational program is being improved to work even more closely with other educational forces and the farmer.

The industry has no simple solution to the complex agricultural problems which face our Nation. It is convinced, however, that it must continually gear its own program to meet the future. It is determined to continue to work with all agencies which have a role in solving this problem for our Nation's welfare.

SHADE TREE MEET

(*Continued from page 47*)

A motion picture "The Other Side of the Fence," produced by Phillips Petroleum Co., and the Missouri Agricultural Experiment Station, supplemented a discussion of "The Value of the Rarer Elements in Plant Nutrition," prepared by Dr. A. A. Nikitin, director of agricultural research, The Tennessee Corp., College Park, Ga. Another film, shown during the conference by R. J. McCafferty, of Davey Tree

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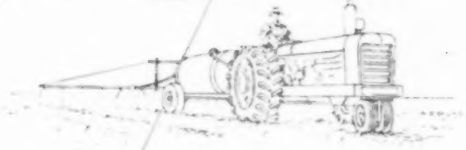

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The effective use of concentrated 2,4-D amine solutions for weed control has been made difficult, and sometimes impossible, in many agricultural regions because of *hard water* conditions. But *now* the precipitation of undesirable salts (caused by the dilution of concentrated 2,4-D amine solutions with "hard" water) can be avoided.

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Since many of the richest agricultural areas in the country have water classified as hard or very hard, the introduction of Pittsburgh IMINOL-D is a development of significant importance to herbicidal spray manufacturers.

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Expert Co., Kent, O., portrayed the training of applicants for position of "Tree Doctor" with Davey.

The question "What is the best method for cleaning tanks when changing from 2,4-D to other chemicals?" evoked a lively discussion when asked at one of the forum sessions. Various practices were reported by individuals but the most emphatic advice given was "Don't change," since there is no guaranteed way to eliminate all the 2,4-D.

TECHNICAL BRIEFS

(*Continued from page* 63)

were, however, no differences in the results obtained at harvest with these two materials and with toxaphene. Chemical analyses showed that the parathion was not applied close enough to the harvesting period for best results.

Benzene hexachloride and parathion applied on peach drops prevented many plum curculio larvae from maturing, but chlordane was not so effective. Parathion affected the larvae that managed to emerge from treated drops, and it also affected larvae in the soil.

Benzene hexachloride (6 per cent gamma) at 4 pounds per 100 gallons applied on March 22, April 19, and May 31, the last application being 4 weeks before harvest, did not affect the flavor of the ripe fresh peaches. Hexaethyl tetraphosphate and tetraethyl pyrophosphate, at the rate of 1 to 800, caused foliage injury and defoliation, and the pyrophosphate injured 1.1 per cent of the harvested peaches. No injury to peach fruit, foliage, wood, or buds resulted from sprays of benzene hexachloride, chlordane, toxaphene, or parathion. Lead arsenate caused about the usual amount of injury. —Oliver I. Snapp, U.S.D.A., Bur. Entomology & Plant Quarantine.

1948 INSECTS

(*Continued from page* 55)

with insecticides, a slightly larger proportion of the total acreage treated there than during 1947. Pea aphid infestations were also heavy and widespread in the Palouse area of Washington and Idaho. Dealers and insecticide distributors estimated that about three-fourths of the acreage was treated, and some pea processors expressed the belief that the 1948 infestation was the most severe pea aphid infestation experienced in the area.

The green peach aphid again caused widespread concern in 1948 as a pest in tobacco in Florida, Georgia, South Carolina, and North Carolina. It also occurred in sufficient numbers to cause damage in several other states, notably Virginia, Connec-

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ticut, and Massachusetts, and to a lesser extent in Tennessee and Maryland.

Space does not permit a more complete review here of the status of insect pests during the past year. However, additional data with regard to these and other pests will be available in the Summary of Insect Conditions in 1948, soon to be issued by the Bureau of Entomology and Plant Quarantine.

Now for just a brief glance at the current status of a few pests that are active at this time of year in southern areas. The serpentine leaf miner caused some injury to beans, tomato, squash, and potato in Dade County and other parts of Florida during the last half of January and first half of February 1949. Cabbage caterpillars and aphids caused light to moderate injury to cabbage and related crops in Virginia, South Carolina, Georgia, Florida, Alabama, and Louisiana during that same period. The southern cabbageworm was abundant in many fields of broccoli in the Rio Grande Valley of Texas toward the end of January and heavy infestations of turnip aphids were reported on young cabbage. A heavy freeze, which occurred in the lower Rio Grande Valley around the first of February, ruined most of the vegetables there. The vegetable weevil continued to injure turnips, mustard, and other crops in many southern vegetable-growing areas. The yellow-margined leaf beetle, previously referred to in this column as the cabbage leaf beetle, and which was first discovered in 1947 in the vicinity of Mobile, Alabama, was extremely abundant early in February in some plantings of turnips and mustard in the Mobile district. Aphids have been reported as generally present in Florida on such crops as potato, celery, and cucumber. The spinach aphid was observed in small numbers on spinach in Virginia, and a light infestation of the pea aphid occurred on peas in the Charleston section of South Carolina early in February.

CONTAMINATION

(*Continued from page 38*)

serious reactions against the processor. The vinegar or fruit fly is a troublesome insect in some processing procedures. Canners of such products as tomatoes, peaches, jams, and preserves are often handicapped by the presence of swarms of these little gnats in and around the packing plants. These insects breed in the fermenting fruits and vegetables in the fields and in wastes of the processing plants. Better sanitation is a partial answer but not the whole one, and research on the entire problem is needed. Removal of insects, and insect fragments from fruits and vegetables is recognized as a difficult

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MUNCY PENNSYLVANIA

problem, but it is one that should be thoroughly investigated. Small scale work along this line has been started by the Bureau of Entomology and Plant Quarantine under the recently passed Research and Marketing Act.

Dairy Products and Meat.—There are two distinct problems relating to insects that concern the manufacture of dairy products and the consumer. One of these is the prevention of contamination of such products by the insects themselves and the organisms they carry; the other is the possible contamination of dairy products by insecticides. It is known that dairy products, especially cream, butter, and cheese, may contain small amounts of DDT or other chlorinated insecticides when the dairy animals are sprayed with these insecticides or when crops treated with insecticides are fed to them. It is also known that the application of insecticides to livestock or the feeding of materials carrying insecticides causes some of the insecticide to be deposited in the fatty tissues. The quantity of such materials excreted in the milk or stored in the fat appears to be directly proportional to the quantity of the insecticide applied or consumed and the duration of intake.

The length of time between application of an insecticide and the harvest of the feed or fodder has an important bearing on the quantity of the residue. It appears also that the method of storage affects the persistence of the residue; for example, the residue in fodder stored as ensilage gradually decreases.

The character and quantity of the food intake may have an effect on the deposition and excretion of the insecticide consumed. Sauberlich and Baumann of the Wisconsin Experiment Station have shown that DDT toxicity is stepped-up when ingested with fats. When protein in the diet was reduced to 10%, the DDT toxicity was doubled, and when the intake of proteins was increased to 50%, the DDT was rendered practically nontoxic.

Research conducted by the Bureau of Entomology and Plant Quarantine, the Bureau of Animal Industry, and Texas Agricultural Experiment Station under the Research and Marketing Act, has shown that there is little difference in the absorption of the toxicant, whether it is applied as a wettable powder or as an emulsion; also, that there is considerable difference in the extent to which different chlorinated hydrocarbon insecticides are stored in fat and excreted in milk. This research indicates for instance that methoxychlor applied to cows as a spray for horn fly control does not appear to any extent in milk. There is no concrete evidence that any ill effects

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on man have resulted from the use of meat, milk, or other foods contaminated with DDT, or related materials used in insect control. Livestock given quantities of insecticides far above those found present as usual residues have developed and reproduced normally. However, until the whole question of chronic effects has been studied and observed extensively, sweeping conclusions should not be drawn.

Intensive Cooperative Research Needed. — It is obvious that there are many ramifications to this toxicology problem and that investigations of many aspects are urgently needed. Promising new insecticides and fungicides are appearing at the rate of several each year and the toxicological work on them should proceed at a pace that will keep abreast of the discovery and introduction of such materials into general use.

There is often a close relationship between the toxicity of a material to insects and to higher animals. No insecticide can be said to be totally nonpoisonous to higher animals. There is, however, a wide range in the degree of toxicity of insecticides to such animals. Also there is a wide range in the susceptibility of different kinds of pests to an insecticidal material. What we must strive for is to find insecticides and insecticide formulations that are as effective as possible against our insect enemies and at the same time as innocuous as possible to man, other animals, and to beneficial insects..

One of the difficulties both in connection with research and enforcement of controls is the difficulty of measuring small quantities of insecticides in the various materials in which they may be found. As a matter of fact, even now, no method of determining specifically some of the

new chlorinated hydrocarbon insecticides has been found. This is a field demanding further intensive research.

Problems connected with the use of insecticides have been intensified by high crop values, by the laudable desire of farmers to protect food and feed crops, by the widespread feeling that the new insecticides will work magic, by the availability of the materials to the public, by sales promotion efforts, and by the lack of sufficient information on the part of the public on when, where, and how to use insecticides.

We have been using highly poisonous materials for years in combating insect pests. Nicotine, arsenicals, and fluorides have been used widely and of course not entirely without accidents and certain undesirable side effects. Through research on adjustment of spray schedules, methods of residue removal, soil treatment, and reasonable care in proper application, many of the difficulties have been lessened or removed. The acute toxicity to higher animals of a number of the new chlorinated hydrocarbon insecticides is considerably less than for some of the materials previously used. However, the discovery and rapid development of a considerable number of insecticides in the last seven years has placed squarely before all of us many problems which demand immediate and extensive research. These problems can be solved only by the harmonious cooperation of entomologists, pharmacologists, toxicologists, plant and animal pathologists, soil specialists, nutritionists, physicians, veterinarians, law enforcement officials, the industries concerned, and the public generally.

The benefits to be derived from the proper use of the new insecticides are too great even to talk of prohibiting their use, as some have, without a sound basis for concluding that they cannot be employed safely. Think of what it means to increase potato production 100 bushels per acre, to treble the yield of legume seed, so much needed for soil building and for the prevention of soil erosion, to increase the apple crop of 1948 by an average of 15% over that of 1947 as shown by a survey conducted by the National Apple Institute, to increase yields of field corn from 10 to 40 bushels per acre, and to add 10% to our milk supply through control of the horn fly and cattle lice.

These tremendous benefits from the use of insecticides must be recognized but we must take every possible step to safeguard our foods and avoid possible hazards to human health. There are many questions throughout this whole field that demand answers and it is only through carefully planned and amply financed research that they can be obtained.

SPRAYING SYSTEMS

TeeJet SPRAY NOZZLES

for WEED KILLING

SPRAYING SYSTEMS TEEJET SPRAY NOZZLES AVAILABLE FOR EITHER FEMALE OR MALE PIPE CONNECTIONS

The TEEJET is America's most accurately machined spray nozzle. That's why you can depend on it for perfect distribution at all capacities and pressures, even down to 2 gallons per acre. May be used with spray rigs or hand sprayers. Interchangeable orifice tips for WEED KILLING and all other farm spraying needs. Send for details . . . ask for Bulletin 55.

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Suburb of Chicago

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One Sprayer
FOR EVERY PURPOSE

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that does it!

1. Fine Fan-Shaped Spray for DDT

2. Fine Hollow Cone Spray for Gardens

3. Coarse Fan-Shaped Spray for Weeds and Painting

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Change Sprays in a Jiffy!

Universal compressed air sprayers sell like hot-cakes because they are ideal for nearly every type of spraying. All it takes is a quick, simple adjustment of the nozzle to change the spray from one type of use to another!

Universal makes a complete line of compressed air and hand sprayers — built to the highest standards of quality by sprayer specialists. It's a fast selling high profit line with suggested retail prices including a full **50% DEALER MARK-UP**

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Plants and Mines Located at

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Ask For Our Pamphlet

Kansas Weed Conference

The eleventh annual Kansas Weed Control Conference was scheduled to be held in the municipal auditorium, Topeka, Kansas, on March 17 and 18. According to T. F. Yost, State Weed Supervisor, the conference was expected to draw the largest attendance it has had for many years.

•

Am. Ag. Chem Elects Bell

American Agricultural Chemical Co., New York, has elected Elliott V. Bell as a director of the company. Mr. Bell is Superintendent of Banks of New York State and is first vice-president of the National Association of Supervisors of State Banks. He is also a director of McGraw-Hill Publishing Co., New York, and holds a number of additional offices in other organizations.

•

Chas. Zorsch to Michigan

Michigan Chemical Corp., Saint Louis, Michigan, has announced the addition of Charles P. Zorsch to its sales staff. Mr. Zorsch will manage sales of the corporation's agricultural line in Iowa, Illinois, Missouri, Nebraska, Kansas and the central southern states, according to Leonard W. Copp, Agricultural Sales manager. Mr. Zorsch is a graduate of the University of Rochester, and holds a degree from Cornell University.

MARKET REPORTS

(Continued from page 51)

will take a considerable amount of additional developmental work before this may be accomplished.

Toxaphene

THE producer of this material indicates that production should prove wholly adequate to take care of all known requirements for the coming season for insect control on cotton. Early season quotations on the 20% toxaphene-40% sulphur combination used for the protection of cotton, indicate a price to the dealer in carload quantities of 15-16¢ per lb.

A recent bulletin, EC-7, on grasshopper control, issued by the Bureau of Entomology and Plant Quarantine, discussed favorably the use of toxaphene and chlordane for the control of this pest.

Chlordane

A RECENT industry report indicated that a substantial tonnage of technical chlordane had been moved into the Canadian market in anticipation of a possible heavy grasshopper infestation. Chlordane has also shown considerable movement in the control of cotton pests and soil insects as well as roaches with household sprays.

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Agricultural Chemists

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3. "Parzate"
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PEGESTA: Emulsifying agent for DDT, Chlordane, Toxaphene and 2-4D esters.
DISPERSANT No. 6—Calcium and magnesium ion dispersant for 2-4D amine salt formulations to inhibit hard water precipitation. Excellent wetting and spreading properties. Samples available on request.

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AN EMULSIFIER OF PETROLEUM OILS

Economical - Effective

MUL-SI-MO is especially adapted for the rapid emulsification of Oils whose viscosity is 120 Saybolt or less.

RANGE COVERED

Oils with a viscosity of 120 Saybolt or less cover the great majority of oils used in Dormant and Summer Sprays.

GENERAL TEXTURE

Mul-si-mo is a thin amber-colored oily liquid about the same viscosity as Kerosene Oil.

METHOD OF USE

There is nothing complicated about the use of Mul-si-mo. It is just poured into the oil to be treated at the rate of ½ to 1½, depending upon the tightness of emulsion desired—then thoroughly stirred—and the process is completed.

RESULT OF MIXING AS ABOVE

A practically 100% Oil Product — No Water — No Soap — No Potash nor other Alkalines.

NEUTRAL PRODUCT

Mul-si-mo is Neutral. Mul-si-mo-Made Emulsions are not adversely affected by pronounced saline, alkaline or acid reacting waters.

ECONOMICAL TO USE —LOW COST

Mul-si-mo, we believe, is the cheapest and most economical Emulsifier on the market for the emulsification of the oils above specified.

NON-TOXIC TO PLANTS

Extensive tests have shown Mul-si-mo to be non-toxic to plants when used at a dilution of 1 to 100. (Plants used in tests — Coleus.) As summer oils are usually used at the dilution of half-gal. to 100 gals. water, at such dilution the rate of Mul-si-mo to water would be 1 to 20100.

COST OF MUL-SI-MO

Per Gallon 5¢ *per Gallon*
and up at $1.74 *per Gallon, in Gallon Drums at* $1.50 *per Gallon, each New York or Jersey City. (Home prices for U. S. only. Foreign prices on request.)*

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A 4 Oz. Sample will be sent upon request.

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PYROPHYLLITE

The World's Greatest Diluent & Carrier Absolutely Non-Abrasive and Adheres Readily to Foliage and all Surfaces.

PHYLLITE'S UNIFORMITY IS UNSURPASSED

A chemical analysis run consistent in every batch of PHYLLITE assures the insecticide manufacturer of absolute uniformity for use as a diluent and carrier. PHYLLITE is ground in a Raymond Mill—95% through 325 mesh. Has a low pH (5.1).

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Monohydrated

ZINC SULPHATE

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- **Controlling Leaf Spot on Peaches**
- **Use As A Buffer In Arsenical Sprays**

ACARCO Monohydrated Zinc Sulphate has a metallic zinc content of 32%. It comes in the form of finely powdered, extremely free flowing crystals that are ideal for dusting . . . exceptionally soluble for use in sprays.

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There has recently been a considerable amount of discussion of a new material designated by the common name heptachlor, which has been available in limited quantities for experimental purposes. However, it is believed that a new compound designated tentatively as "Compound 118" may eventually take the place of heptachlor. "Compound 118" is designated as a chlorinated hydrocarbon stable in alkaline solutions and emulsions. It shows promise of greater toxicity towards insects than either heptachlor or chlordane. However, during the 1949 season it will be available only in experimental quantities.

A recent U. S. Department of Agriculture release referred to the possibility of a grasshopper plague in wide area of the United States during the coming spring and summer seasons. It is indicated that outbreaks of the pests may occur in many localities from Michigan to California and Texas to Canada. Failing unfavorable weather conditions during the next few months, it is possible that there will be a large tonnage of insect toxicants needed for the control of this pest for the coming season. It is expected that infestations will be particularly severe in Montana, Wyoming, Colorado, in western Nebraska and Kansas, and in the State of Texas.

Recent trade dispatches indicated production of technical DDT has been started in Japan. The Department of Commerce was asked concerning this DDT production and latest information available indicates that there is capacity in Japan for about 50 tons of material monthly.

There have been recent press releases concerning the compound DFDT which is the Difluro derivative of DDT. It appears, according to U.S.P.H.S. releases, to be less poisonous than DDT to warm-blooded animals and fish. However, industry spokesmen point out that the cost, particularly in limited production, would be considerably higher than DDT or any of its other analogues presently being made such as methoxychlor and DDD. However, work is progressing toward finding possible use of this material, so there should be additional reports available during the coming season.

•

Japanese Up Fertilizer

Production of ammonium sulfate and superphosphate in Japan for November exceeded goals originally set by the Ministry of Commerce and Industry, it has been reported in the U.S. The additional output was said to be due to improved supplies of electrical power and pyrites. Ammonium sulfate production amounted to 82,888 tons, which was 4 percent over the goal; superphosphates, 87,405 tons, 11 per-

What's Your Problem?

Aphid Spray
•
Nicotine Base for Dust
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Controlling Poultry Roundworm
(Ascaridia galli)
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Delousing Poultry
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1. The FAMOUS BLACK LEAF 40 — for spraying or dusting to control small sucking insects, plant lice, and similar pests. Also used to control external parasites of cattle, sheep and poultry—and as a drench for sheep.
2. BLACK LEAF 155 — for spraying apples and pears to control codling moth, also for controlling grape berry moth.
3. BLACK LEAF DRY CONCENTRATE — used as a spray or dust — a dry powdered nicotine compound for easy mixing and handling.
4. BLACK LEAF 155 WITH DDT — for spraying apples and pears for the control of codling moth, leafhoppers, and similar pests.
5. BLACK LEAF 10 DUST BASE — meets the demand for a nicotine compound easily mixed with non-alkaline carriers to make a neutral dust.
6. BLACK LEAF CUNIC DRENCH — for sheep and goats. Formula recommended by U. S. Department of Agriculture.
7. BLACK LEAF POWDER AND PELLETS — for controlling the large roundworm (Ascaridia galli) in chickens.
8. MASH-NIC — for mixing with poultry feed to control large roundworm.
9. NICO-FUME LIQUID — for greenhouse spraying and fumigating — especially refined.
10. NICO-FUME PRESSURE-FUMIGATOR — spreads penetrating fumes under pressure — controls aphids and similar insects in greenhouses.

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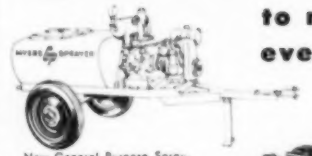
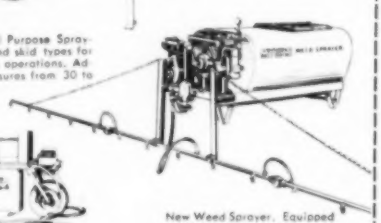


New General Purpose Sprayer. Wheel and skid types for gun or boom operations. Adjustable pressures from 30 to 400 pounds.



New Weed Sprayer. Equipped with universally favored Myers pump; 21-foot adjustable folding boom.

Wheelbarrow-type Sprayer. Powered by electric motor or gas engine.

Full range of orchard Sprayers; power take-off and engine driven.

Field and row crop Sprayers for any size acreage.

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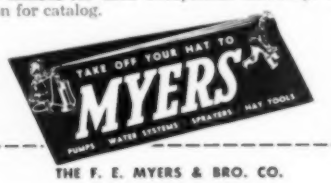
With a Myers Sprayer on the job, all the fast-killing action of a modern liquid spray is put to work *where needed*. Every Power and Hand Sprayer in the all-inclusive Myers line is engineered to deliver top results on every operation . . . built to give long, trouble-free service . . . and backed by Myers unmatched record of advancing sprayer efficiency.

Myers has anticipated all spraying requirements . . . with over 100 different models in both wheel and skid types. Included are sprayers ideally suited for orchard and row crop applications; a special Weed Sprayer; a brand-new General Purpose Sprayer for all 'round farm use—each thoroughly proved and world-famous for their exceptional efficiency. Mail coupon for catalog.



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- Non-Abrasive
- Small Particle Size
- Chemically Adaptable
- Good Adhesive Qualities

For information and samples, write

SOUTHEASTERN CLAY COMPANY
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cent over the goal, and nitrolime, 22,404 tons, which was but 91 percent of the original goal.

WESTERN MINERALS

(*Continued from page 27*)

output is known to be correct. Frequently, differences in materials may not be visible to the naked eye, which adds to the hazard.

Materials unsuited to use as insecticide diluents must be sold for other uses or laid aside as waste. In the latter case, the cost of operations is expanded which is reflected in the higher selling price of the useful products.

In western mining operations, the deposits can be operated only during certain months of the year in many cases. It behooves the insecticide manufacturer to scrutinize any new source of non-metallic minerals very carefully for year around availability and uniformity of product.

Price is still a factor in chosing a diluent. The usual price range is from ¾ cents to 2½ cents per pound of finished dust. It is therefore important that the manufacturer select the carrier which accomplishes the most for the active ingredient involved.

Personal Equation.

THE personal equation based on the experience and judgment of the compounding chemist, is of more importance than most compounders are willing to admit. Many things beyond the control of the chemist can happen to an insecticide dust. When a particular compound has proved ineffective in the field, the carrier is one of the first things to be changed as it is one variable which can be controlled readily. So it is that some diluents are actively disliked by one compounder, and preferred enthusiastically by others.

The manufacturer of insecticides will probably be able to find at least one non-metallic mineral which will have all the necessary characteristics. Combinations of minerals have been the answer to many carrier problems.

When the combination and methods of physical measurement become somewhat standardized, it will be possible for the producer of non-metallics to deliver specific diluents for specific purposes. This is the ultimate goal.

BIBLIOGRAPHY

1. "Properties and Commercial Sources of Insecticide Dusts, Diluents and Carriers." Watkins & Norton, Cornell Univ., Feb. 1947. 259 pp.
2. "Industrial Minerals and Rocks." AIME, 1937. 955 pp.
3. "Non Metallic Minerals," Ladoo, McGraw-Hill, 1925. 686 pp.
4. "Pumice & Pumicite," Paul Hotmaker, USBM., IC 6560, 1932. 23 pp.
5. "Marketing Silica," Nan C. Jensen, USBM., IC 7202, 1942. 39 pp.
6. "Marketing Talc, Pyrophyllite, and Ground Soapstone," Bertrand L. Johnson, USBM., IC 7080, 1939. 13 pp.
7. "Diatomite," Paul Hatmaker, USBM., IC 6391, 1931. 20 pp.
8. Private papers and trade circulars from producers.

RESEARCH PROGRESS

(*Continued from page 30*)

is also several-fold greater.

2. A large amount of this applied research in the fields of soil fertility and management will be conducted by the State agricultural experiment stations. The Bureau will cooperate by furnishing radioactive fertilizers; and both Beltsville and field stations will assist and participate in such work to a limited extent.
3. Currently only a few States have the essential facilities and trained personnel for this work.

This situation affords the industry and the Phosphate Research Committee a further opportunity to support effectively the cooperative research program. We hope such support will include the advice and cooperation of industry agronomists. They have had a very constructive influence on several lines of soil and fertilizer investigations. We invite them to participate in these studies and to see that isotopic methods are used where they can most effectively contribute to the solution of practical problems.

AMAZING

NEW

ORGANIC PHOSPHATE INSECTICIDE

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★TETRON

Tetraethyl Pyrophosphate—Technical

BETTER KILL

LOWER COST

This amazing new basic insecticide material is a revolutionary improvement on standard HETP for control of aphids, spider-mites and other insects.

Eston TETRON has approximately twice the strength of standard HETP and the price per unit of active ingredient has been drastically reduced.

AVAILABLE IN 3 FORMS:

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A straight chemical containing 100% active ingredients.

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50% active ingredients plus 50% solvent and emulsifier.

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25% active ingredients plus 75% solvent and emulsifier.

Eston TETRON is manufactured under the same close chemical and biological control that characterizes Eston HETP. Each plant run is checked before shipment to guarantee uniformity of performance.

Immediate delivery — substantial quantities. Write or wire for full price and technical information.

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1949 Officers of Cotton States Branch, A.A.E.E.

Dr. E. W. Dunnam
Chairman for 1949

Dr. John T. Creighton
Retiring Chairman

W. C. Nettles
New Vice-Chairman

Since the meeting dates of the recent Cotton States Branch, A.A.E.E. were too close to our February deadline, it was not possible to publish photos of new officers with the story which appeared last month.

Dr. Dunnam, president of the Cotton States Branch for 1949, is in charge of cotton insect work for the U.S.D.A. at Stoneville, Mississippi. Dr. Creighton, retiring chairman, is connected with the University of Florida, Gainesville. He will be a member of the Cotton Branch executive committee. Mr. Nettles, vice-chairman, is extension entomologist at Clemson College, Clemson, S. C.

The secretary-treasurer of the Cotton States Branch, K. P. Ewing, Agricultural Research Administration, B.E.P.Q., Waco, Texas, was re-elected to the post. We regret that Mr. Ewing's photo was unavailable in time for use in this issue.

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Industry Patents

2,459,138. Nicotine and Beta-beta-dichlor-ethyl ether insecticide. Patent issued January 18 to Owen T. Coffin and David J. Raden, Los Angeles, assignors to Swift & Co., Chicago. An insecticide comprising nicotine and beta-beta-dichlorethyl ether said nicotine and said beta-beta-dichlorethyl ether being present in a sufficient amount to provide, as compared with the separate insecticidal properties of the components, an improved insecticide that is effective over a longer period of time, that is effective under acid conditions, and that retains a greater insecticidal property at lower temperatures.

2,459,525. Triphenylmethyl butyl ether as an insecticide. Patent issued January 18, to Ingenuin Hechenbleikner, Stamford, Conn., assignor to American Cyanamid Co., New York. An insecticidal composition including a toxic amount of triphenylmethyl butyl ether and a distender.

2,459,526. 1-Napthylmethyl tetradecyl ether as an insecticide. Patent issued January 18 to Ingenuin Hechenbleikner, Stamford, Conn., assignor to American Cyanamid Co., New York. A method of combating insect pests which includes exposing them to a toxic quantity of 1-naphthylmethyl tetradecyl ether.

2,460,188. Fungicidal Compositions. Patent issued January 25 to Walter C. O'Kane, Durham, N. C. and Glen H. Morey, Terre Haute, Ind., assignors to Commercial Solvents Corp., Terre Haute, Ind. A method for supressing parasitic fungus growths on living plants which comprises bringing into contact therewith a kojic acid salt of a divalent heavy metal, said heavy metal having a specific gravity between 7 and 14.

2,460,365. Production of Insoluble Sulfur. Patent issued February 1, to Alvin Schallis, Jersey City, N. J., assignor to Stauffer Chemical Co. A process for reducing the rate of reversion of that form of sulfur which is insoluble in carbon disulphide to that form which is soluble in carbon disulphide comprising incorporating, in preformed sulfur containing at least a third by weight of said insoluble sulfur, less than about 1% of a halogen on the weight of the sulfur.

2,460,710. Fungicidal Preparations. Patent issued February 1, to Kenneth G. Nolan, S. Norwalk, Russell L. Morgan, Old Greenwich and John H. Fletcher, Riverside, Conn., assignors to American Cyanamid Co., New York. A method of controlling organisms, which cause decay of citrus fruits which includes applying to said fruit a toxic quantity of a water soluble compound selected from the group consisting of 2-aminopyridine and its salts of acids.

2,460,792. Organic medium for the Production of Aerosols. Patent issued to Arthur C. Pabst, Douglaston, Albert E. Griffiths, Port Washington, and Robert B. Killingsworth, Douglaston, N. Y., assignors to Socony-Vacuum Oil Co., New York. 1. An organic medium for the production of thermal aerosols having a boiling range of about 242° to about 742° F., said medium consisting of about 25 per cent to about 65 per cent of a more volatile hydrocarbon fraction and the balance a less volatile hydrocarbon fraction; said more volatile fraction having an initial boiling point of about 240° to about 370° F., a final boiling point of about 320° to about 530° F., a 50 per cent point of about 275° to about 440° F., and a 90 per cent point of about 295° to about 500° F.; said less volatile fraction having an initial boiling point of about 505° to about 570° F., a 10 per cent point of about 540° to about 621° F., and a final boiling point of about 630° to about 740° F.; and the 90 per cent point of the more volatile fraction being separated from the 10 per cent point of the less volatile fraction by about 111° to about 325° F.

2,461,010. Process for the Recovery of Ammonia. Patent issued February 8 to John W. Teter, Chicago, Ill. and Robert H. Stookey, Whiting, Ind., assignors to Sinclair Refining Co., New York. In the amination of propylene wherein a mixture of propylene and ammonia is brought at an elevated temperature and pressure into contact with a catalyst capable of selectively aminating the propylene, the improvement which comprises stabilizing the resulting mixture to recover the aminated propylene and to produce a gaseous mixture of the unreacted components consisting predominantly of ammonia, propane and propylene, cooling the gaseous mixture to a temperature of about 0° F. under sufficient pressure to establish substantially liquid phase conditions at such temperature, effecting settling of the cooled liquid mixture with resulting formation of two distinct layers one of which comprises predominantly the ammonia and the other comprises predominantly the propane and propylene, separating the layer comprising predominantly the ammonia and the layer comprising predominantly the propane and propylene and returning the ammonia to the amination operation.

2,461,852. Stabilization of DDT. Patent issued February 15, to Gustav A. Stein, Plainfield and Max Tishler, Rahway, N. J., assignors to Merck & Co., Inc., Rahway. The process of stabilizing DDT which comprises heating an aqueous mixture containing molten alpha alpha-di (p-chlorophenyl)-beta, beta, beta-trichloroethane and less than about 0.5%, based on the weight of the DDT, of a weakly basic compound at a temperature of approximately 105° C., thereby evaporating the water and forming a substantially homogeneous liquid mixture of the other components, and cooling to solidify said mixture.

2,462,034. Spraying System. Patent issued February 15, to Ivan Vance Zeck, Iowa Park, Texas, assignor to Lee Lavere Thompson, Iowa Park, Tex. In an insecticide spraying system, the combination of a mixing receptacle adapted to contain a spray solution, a pump, pipe connections between the pump and the receptacle to withdraw the solution from the receptacle and to direct said withdrawn solution under pressure from said pump, and horizontally arranged mixer tubes mounted in the receptacle at different elevations therein and connected with the pipe connection from the pump for directing the solution back into the receptacle to agitate the solution therein, mixing Venturi jets carried by the mixer tubes and in positions to receive the solution therefrom, and a valve for controlling the flow of the solution to at least one of the mixer tubes.

2,461,067. Liquid Fertilizer Apparatus. Patent issued February 8, 1949, to Richard O. Lewis, Los Angeles, Calif. In a device of the character described, a casing, a vertical tube extending through said casing and defining therewith an annular chamber means for connecting the upper end of the tube bore to a water supply, the lower end of the tube opening to the exterior of the casing, a diametrical restriction in the tube bore and adapted to create a low pressure zone in said bore when water courses therethrough, there being a port near the restriction and opening from the chamber to the low pressure zone of the tube bore, and there being a port below the first mentioned port and opening from the tube bore to said chamber.

Trade Mark Applications

Drought, in slender capital letters, for insecticidal chemical. Filed Feb. 9, 1948 by John T. Berdan, doing business as Drought Products, La Mirada, Calif. Claims use since July, 1946.

Fosvex, in heavy capital letters, for insecticide. Filed June 10, 1948, by Westvaco Chemical Corp., New York. Claims use since Nov. 21, 1947.

Stadlers superior TNT, with "TNT" superimposed over circle containing remainder of name. For fertilizer. Filed September 9, 1947, by the Stadler Products Co., Cleveland, Ohio, assignor to the Stadler Fertilizer Co., Cleveland. Claims use since Sept. 1, 1940.

Anchor Brand, in capital letters, with motif of an anchor. For superphosphate fertilizer. Filed Apr. 12, 1948, by Stauffer Chemical Co., San Francisco. Claims use since Dec. 31, 1903.

Eastern States Cooperative, in horseshoe shaped arc, for insecticides, fungicides, repellents, etc. Filed Mar. 5, 1948, by Eastern States Farmers' Exchange, W. Springfield, Mass. Claims use since Apr. 5, 1934.

Purina, in heavy capital letters, for insecticides and fungicides. Filed Mar. 22, 1948, by Ralston Purina Co., St. Louis, Mo. Claims use since May 1, 1931.

Trex, in stencil capital letters, for emulsifiers for insecticidal materials. Filed Aug. 19, 1947, by Griffin Chemical Co., San Francisco. Claims use since April 11, 1947.

Hoffman, in Italic letters, for plant food, bone meal, dehydrated manure, agricultural lime and peat moss used as a soil conditioner. Filed Sept. 30, 1947, by A. H. Hoffman, Inc., Landisville, Pa. Claims use since 1934.

Flowerite, in script letters, for expanded perlite for use as a soil conditioner. Filed Oct. 31, 1947, by Dant & Russell, Inc., Portland, Oregon. Claims use since July, 1947.

Classified Advertising

Rates for classified advertisements are ten cents per word, $2.00 minimum, except those of individuals seeking employment, where the rate is five cents per word, $1.00 minimum. Address all replies to Classified Advertisements with Box Number, care of AGRICULTURAL CHEMICALS, 254 W. 31st St., New York 1. Closing date: 25th of preceding month.

positions open

Agricultural Sales: Established chemical firm requires man for field sales and service work in fumigants and allied chemicals. Dealer and consumer trade, willing to travel. Background in Horticulture or related fields desirable. Headquarters in Philadelphia. State experience and salary desired. Address Box 328, care of Agricultural Chemicals.

Salesmen: Two men required by large chemical manufacturing organization, one in northeast and one for southeastern territory. Men who know and have sold agricultural chemicals to dealers and distributors. Preferably technically educated. Excellent opportunity in growing department. Give full details in letter to Box No. 329, care of Agricultural Chemicals.

positions wanted

Chemical Sales Executive: 35, well known, completely grounded in agricultural and industrial markets (bulk and consumer package). Product development, field research and sales administration. Knowledge organic fungicides, herbicides, insecticides, detergents, antiseptics, germicides, textile finishes, resins, rubber compounds, emulsifiers, degreasers. Seeks responsible position with progressive manufacturer chemical or allied field. Locate New York or environs. Address Box 330, care of Agricultural Chemicals.

Salesman: Chemist with three years experience in petroleum research and analysis and one year sales and field experience in insecticides—herbicides, desires sales position in Midwest. Well versed in agricultural chemicals, farm background, age 26, ambitious, personable, has car. Address Box 331, care of Agricultural Chemicals.

Agricultural Chemical Salesmen desires new connection. Agricultural graduate with additional experience in field research. Contacts with sales outlets and experiment stations east of the Mississippi. Address Box 332, care of Agricultural Chemicals.

ALVIN J. COX, Ph.D.
Chemical Engineer and Chemist
(Formerly Director of Science, Government of the Philippine Islands. Retired Chief, Bureau of Chemistry, State of California, Department of Agriculture.)
ADVISOR ON AGRICULTURAL CHEMICAL PROBLEMS AND INVESTIGATIONS
Consultant in reference to spray injury and damage, claims, including imports of fruits and nuts, formulas, labeling, advertising and compliance with law.
1118 Emerson Street
Palo Alto, California

CONSULTING ENTOMOLOGIST
Insecticides — Formulation
Plant Pathology — Research
Entomology — Legal Service
Author of
"Chemistry & Uses of Insecticides"
DR. E. R. de ONG
926 Stannage Ave., Albany 6, Calif.

Chemicals: Salesman with wide experience in fungicides, insecticides and weed control chemicals desires new connection with manufacturer with opportunity for future. Prefer location eastern seaboard, particularly Metropolitan New York as work base. Proved sales record, best references. Address Box No. 333, care of Agricultural Chemicals.

miscellaneous

Wanted Business: Chemicals, fertilizers, insecticides, veterinary supplies, feeds or seeds, manufacturing, wholesale or retail, by live wire sales manager now employed. Present volume of business secondary. Outright purchase or partnership or similar arrangements considered. All correspondence strictly confidential. Address Box 334, care of Agricultural Chemicals.

Research Fellowships—Pest Control Chemicals: Two fellowships available July 1, paying $1,344 plus tuition; one month vacation. Research on synthesis or biological testing of new chemicals against insects, etc. Permits 10 semester credits in agricultural chemistry and related subjects towards M.S. and Ph.D. Applicant must have B.S. in chemistry, biochemistry or entomology (with strong chemistry minor). Send photograph and resume of training to Donald E. H. Frear, Dept. Agricultural and Biological Chemistry, Pennsylvania State College, State College, Pa.

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Wotherspoon Marries

Robert Wotherspoon, Orbis Products Co., New York, well-known in the insecticide and allied industries, was married on February 19, to Mrs. Florence DeYung Stulb. The wedding took place at Wynnewood, Pa. Mr. Wotherspoon is general manager of the Orbis plant at Newark, N. J. The couple will reside in New Jersey.

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Arkansas Studies 2,4-D

Sale, possession or use of 2,4-D or other economic poisons or devices which in any way would endanger public health or safety or would injure plant or animal life will be prohibited in the State of Arkansas if the legislature passes a bill which has been introduced by State Senator Donald Poe. Under the provisions of the bill, the State Plant Board would be empowered to require registration and bonding of persons handling economic poisons or devices, and registrations could be cancelled for violation of regulations prescribed by the Board. A fine in any amount up to $300 could be imposed on conviction, for each separate violation. At press time, the legislature was reported to be deliberating.

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So. Tree Conference Meets

A tentative program for the Southern Shade Tree Conference which was scheduled to be held at the Hotel Thomas, Gainesville, Florida, March 23-25, has been released by Dr. John T. Creighton, secretary of the group. The program, in addition to the presentation of prepared papers, was to include a field demonstration of application equipment, a mist blower conference, open forums, and a picnic.

John Appointed by Heinz

Charles A. John has been named head of the Crop Research Department of H. J. Heinz Company, at the firm's experimental farm and plant breeding grounds, Bowling Green, Ohio. Mr. John will supervise Heinz operations in the development of new tomato varieties which have greater resistance to disease and which offer greater yields.

•

Entomologist Honored

Edwin Gould, West Virginia University Experiment Station entomologist, was honored February 11 by the W. Virginia Horticultural Society at Martinsburg for giving "the most distinguished and outstanding service to the industry during the past year." The award, made at the society's annual dinner, was in recognition of Mr. Gould's work in control of the leaf roller.

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Mich. Dealer Conference

The Institute of Short Courses, Michigan State College, was the sponsor of an Insecticide Fungicide conference for dealers in pesticides on January 11 and 12. The program was jointly arranged by the Short Course staff and a committee from the Michigan Insecticide Fungicide Institute. Topics discussed were those confronting Michigan dealers; how to advise the small grower; livestock pests; brown rot control, new insecticides, etc.

The highlight of the conference was an address by Dr. John C. Dunegan, U.S. Department of Agriculture. He detailed experimental work indicating there are several chemicals useful in brown rot control. The point was stressed that understanding the way brown rot develops and taking advantage of this knowledge, is as important as the application of chemicals. Fungicidal sprays at blossom time seemed most worth while, he said. Some 105 dealers were registered at the meeting.

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(The Advertisers' Index has been carefully checked but no responsibility can be assumed for any omission.)

It can happen!

It can and has happened! It can and has happened to the product that became so hot marketwise that it no longer "needed any advertising!" And to the sales department that became so good in their own estimation that advertising became a waste of money! The record book of Old Man Experience lists many such sad cases,—and also proves that good advertising, correctly timed and aimed at the right market is "never" a waste of money.

And if that market happens to be in the field of chemicals for agriculture, we feel certain that Old Man Experience would suggest regular advertising in

AGRICULTURAL CHEMICALS

254 West 31st Street New York 1, N. Y.

TALE ENDS

CHEMICAL farming is opening tremendous new fields in Australia, according to reports from "down under." It the saga of desert land reclamation, the success of which has led to predictions that in time, some two million acres of present wasteland may be utilized. One pioneering farmer, it is reported, has nearly 2,000 acres of fertile fields which five years ago were broad expanses of grey sand and scrub. Each grazing acre now grows enough fodder to support 3½ sheep, whereas before, there was not enough natural feed for one sheep in 50 acres.

•

Ray L. Cuff, ubiquitous regional manager of the National Livestock Loss Prevention Board, Kansas City, is probably the most outstanding exponent of keeping farm animals free from insect parasites. In a recent article in the *Kansas City Drovers Telegram*, he leads off with "The time is about here when it is little less than a disgrace to have grubby, lousy, scabby cattle, ticky or scabby sheep and mangy, lousy hogs." He then proceeds to elaborate on ways and means to protect livestock, quoting from various U.S.D.A. bulletins and all in all presenting a strong case favoring the generous application of the newer organic insecticides.

•

From the Japanese Institute of Insect Control, Kyoto University, Kyoto, Japan, *Agricultural Chemicals* has received a group of books covering a number of entomological and insecticidal subjects. Although the major portion of the text matter is written in Japanese, some of the summaries appear in English . . . enough to make it readable. We are currently exchanging literature with some of the Oriental schools.

FOR THE EXCLUSIVE USE OF

INSECTICIDE MANUFACTURERS

. . . PRENTOX PEST-TESTED CONCENTRATES

SPRING . . . the time of planting for the farmer . . . is the time of fruition for all of us engaged in supplying his needs. Formulations are set. Manufacture, packaging, distribution are well along. Now your plans and budgets, so carefully laid, can be measured by actual field experience.

As you prepare to move out into the fields, we solicit your cooperation. We, essentially, are raw-material producers. It is our function to make available the active constituents in your finished insecticides. Correct forms, properly-balanced properties, adequate supply and scheduling, these are the things which we can do to help.

But these we can best learn from the field performance of the finished products in your hands. To concentrate on the manufacturing of consistently high-quality materials occupies our full capacities. We must therefore look to you for the exact interpretation of field requirements which alone can guide the progress of insecticides toward ever more effective service.

Thus, in field, orchard and barn, on the range, the feed-lot and in the granary, Prentox Insecticide Concentrates are proved and improved *with your experience as the final control*. Prentox products are for the exclusive use of insecticide manufacturers . . . are directly geared to your own formulation requirements. That is why our technical staff is at your disposal, with your specifications controlling their efforts. By such cooperation, outstanding results are assured.

MICRO MESH DDT POWDERS
PYRETHRUM PRODUCTS
ACTIVATED SABADILLA
ROTENONE POWDERS

LIQUID DDT CONCENTRATES
BENZENE HEXACHLORIDE
FORTIFIED RED SQUILL
CHLORDANE PRODUCTS

R. J. PRENTISS & CO., Inc.

110 WILLIAM STREET, NEW YORK 7, N. Y. — 9 SO. CLINTON STREET, CHICAGO 6, ILL.

AN ANNOUNCEMENT

Concerning the Name

TOXAPHENE

In response to the need for a simple and generally acceptable name for the insecticidal chemical known as chlorinated camphene, Hercules Powder Company has relinquished the trade-mark name Toxaphene. The word toxaphene has now been accepted as a coined common name for chlorinated camphene having a chlorine content of 67%-69%.

Those participating in the acceptance of this common name and concurring in its suitability include: "Chemical Abstracts" of the American Chemical Society; Council on Pharmacy and Chemistry of the American Medical Association; Committee on Insecticide Terminology of the American Association of Economic Entomologists; the National Association of Economic Poisons Control Officials; representatives of the Insecticide Division of the Production and Marketing Administration; the Food and Drug Administration; the Public Health Service; and the Bureau of Entomology and Plant Quarantine.

HERCULES POWDER COMPANY

INCORPORATED

993 Market Street, Wilmington 99, Del.